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Chemicals and Allied Products

Drugs and Pharmaceuticals

EVALUATION OF INTRA-MUSCULAR SELF-INJECTION OF 2 MG. ATROPINE. A: COMPARISON OF EFFECTIVENESS OF AMPIN VERSUS SYRETTE FOR INTRAMUSCULAR SELF-INJECTION BY HEALTHY ADULT MALES. B: SUBJECTIVE FINDINGS RESULTING FROM 2 MG. ATROPINE INTRAMUSCULARLY IN HEALTHY ADULT MALES. C: OBJECTIVE STUDY OF EFFECTS OF 2 MG. ATROPINE INTRAMUSCULARLY IN HEALTHY ADULT MALES, BY ARCHER S. GORDON, MARTIN H. KALSER, SIDNEY SILBERBERG, CHARLES FRYE, UNDER A. C. IVY, HEAD, DEPT. OF CLINICAL SCIENCE, UNIVERSITY OF ILLINOIS, COLLEGE OF MEDICINE, CHICAGO, IN COLLABORATION WITH SHIRLEY A. STAR AND FREDERICK J. MEIER, NATIONAL OPINION RESEARCH CENTER UNIVERSITY OF CHICAGO, ILL. U. S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. Mar 1952. 34p photo, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106823

1. Atropine - Physiological effects 2. Blood pressure - Effect of atropine 3. Injections - Intramuscular 4. CC MD SR10.

STUDIES ON A SERIES OF COLCHICINE DERIVATIVES. I: TOXICITY IN MICE AND EFFECTS ON MOUSE SARCOMA 180, by Benjamin Goldberg, L. G. Ortega, A. Goldin, G. E. Ullyot, and E. B. Schoenbach. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. Sep 1949. 16p photos, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106865

Experiments were made to compare toxicity and effects on a transplantable mouse tumor of a series of colchicine compounds. Toxicity and anti-neoplastic activity do not necessarily change in parallel manner with modification in chemical structure. In the series colchicine, N-Benzoyl TMCA methyl ether, TMCA methyl ether, and N-acetyl colchinol, structural modifications were made which resulted in reduced toxicity, but which permitted retention of antineoplastic activity. The decrease in toxicity was 17-fold while the minimum effective antineoplastic doses varied only 4-fold and ranged from 4.5 - 17 micromoles/kg. It is concluded that toxicity and anti-neoplastic activity of colchicine derivatives do not necessarily change in parallel manner with modifications in chemical structure. Project no. 4-08-03-12. CC MD R210.

Agricultural Chemicals

PEST CONTROL IN GERMANY DURING THE PERIOD 1939-1945, by R. P. Tew. British Intelligence Objectives Sub-Committee. 1951. 122p diagrs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 104309

1. Insecticides - Production - Germany 2. Acaricides - Production - Germany 3. Fungicides - Production - Germany 4. Rodenticides - Production - Germany 5. BIOS OR 32.

Chemical Engineering and Equipment

SMOKES AND FILTERS, BY IRVING LANGMUIR AND KATHARINE B. BLODGETT. SUPPLEMENT TO SECTION I, AND SECTION II. General Electric Co., Schenectady, N. Y. Apr 1944. 50p photos, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106381

1. Filters, Smoke 2. Filters - Design 3. Filtration - Theory 4. U. S. National Defense Research Committee.

Final report under Contract 10-167, OEMsr-131. Supplement to section I is pages 71-76. Section 1, p. 1-70 unavailable.

Miscellaneous Chemicals

CRYSTAL CHEMISTRY OF CESIUM PENTA- AND HEXASULFIDE, by S. C. Abrahams, E. Grison, and J. Kalnajs. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Mass. Mar 1952. 34p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106816

Cesium hexasulfide has been prepared by disproportionation of Cs_2S_5 in aqueous ethyl alcohol and its crystal structure determined. Cs_2S_5, obtained by dehydration of $Cs_2S_5.H_2O$, has been shown to possess a crystal structure similar to that of Cs_2S_6. O. N. R. Contracts N5ori-07801, N5ori-07858. Contents: Technical report 52. Crystal chemistry of cesium penta- and hexasulfide, by S. C. Abrahams, E. Grison, and J. Kalnajs: - Technical report 53. Crystal structure of cesium hexasulfide, by S. C. Abrahams and E. Grison. MIT LIR TR 52. MIT LIR TR 53.

FUNGAL ASSAY OF TWENTY-FOUR ORGANIC CHEMICALS, by Dorothy A. Beck. U. S. Office of the Quartermaster General. Military Planning Division. Research and Development Laboratories. Chemicals and Plastics Section, Philadelphia Quartermaster Depot, Philadelphia, Pa. Oct 1950. 6p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106882

1. Fungicides - Tests 2. Fungus proofing 3. Chemical compounds, Organic - Analysis 4. QMC RSTR C&P 179-F.

See also PB 106881 and PB 106883.

INVESTIGATION OF THE PHENOLIC FRACTION OF CREOSOTE, by T. R. Sweeney and C. R. Walter, Jr. U. S. Naval Research Laboratory. Feb 1952. 11p diagr, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 106763

A study of the tar-acid fraction of A.W.P.A. Grade

1 creosote has been made by selective extraction of the latter with aqueous and Claisen alkali. This study indicated the presence of three groups of hydroxylic compounds: one extractable with aqueous alkali, one extractable only with Claisen alkali, and one unextractable with either aqueous or Claisen alkali. Spectrophotometric measurements indicated the presence of unhindered alkylated phenols in the aqueous alkali-soluble fraction and of unhindered phenols of higher molecular weight in the fraction extractable only with Claisen alkali. The presence of phenyl-phenols was indicated in both fractions. A material balance of the fractions showed that the quantity of phenols extractable with Claisen alkali was about twice that extractable with aqueous alkali. Of the total oxygen of the original creosote, somewhat more than half was extractable with Claisen alkali. A comparison of the oxygen content of the fractions as determined by difference with the oxygen content calculated from active hydrogen determinations indicated that the oxygen could largely be accounted for as hydroxyl. NRI R 3940.

NOMENCLATURE OF ORGANIC PHOSPHORUS COMPOUNDS TENTATIVELY ACCEPTED BY THE ACS COMMITTEE AT CHICAGO, 3-8 SEP 1950, by George M. Steinberg. U. S. Chemical Corps. Technical Command, Army Chemical Center, Md. Sep 1950. 10p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106863

The proceedings of the Committee on Organic Phosphorus Nomenclature are discussed. A complete list of monatomic phosphorus hydrides and acids was tentatively accepted. It was tentatively decided to apply the so-called "A" system to all compounds containing more than one phosphorus atom. Some examples of the tentatively accepted nomenclature are given. CC TCR 602.

VERFAHREN ZUR ABTRENNUNG VON ACRYLSÄURENITRIL (PREPARATION AND SEPARATION OF ACRYLIC ACID NITRILE). I. G. Farbenindustrie A. G., Leverkusen, Ger. 1940-1941. 27p (Text in German) Available from I ibrary of Congress of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106904

1. Acrylic acid nitrile - Preparation - Germany 2. Acrylic acid nitrile - Preparation - Patents - Germany 3. Patents - Germany - J65,109IVc/12o Jan 24, 1940 4. Patents - Germany - 167,617IVc/12o 5. Micro BIOS FD 2650/46 frames 1-27.

English abstract available as PB 106904s. Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25.

Electrical Machinery

Communication Equipment

DETERMINATION OF MICROWAVE ATMOSPHERIC ABSORPTION USING EXTRATERRESTRIAL SOURCES, by M. Schulkin. U. S. Naval Research Laboratory. Oct 1951. 30p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 105592

1. Atmosphere - Sound absorption 2. Radio waves - Atmospheric effects 3. Radiometers 4. Radio waves - Propagation - Curves 5. Radiation, Galactic - Measurement 6. Solar radiation - Disturbances 7. NRI R 3843.

STABILIZED D-C POWER SUPPLY VARIABLE FROM 0-25 VOLTS, by P. A. Redhead. National Research Council of Canada. Radio and Electrical Engineering Division. Apr 1952. 7p diagr, graphs Available from National Research Council of Canada, Ottawa, Canada. $.10. PB 106773

A modified design of the low-voltage power supply, previously reported in "A Stabilized Power Supply for Voltages Below Twenty Volts" (ERA-187), is described. An internal impedance of 0.005 ohms has been obtained, with good long-term stability. The output voltage is adjustable from 0.75 to 23 volts. The maximum current obtainable with good regulation varies from 1.5 amperes at the lowest voltage to 0.2 amperes at the highest. See also PB 101163. NRCC 2684. NRCC ERA 221.

TRUNK TERMINATION AND TEST, by Byron S. Anderson. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Dec 1951. 15p drawings, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106939

1. Telephones - Exchanges - Installations 2. Telephones - Switchboards - Tests 3. Communication systems, Wire 4. SCEL TM M-1414.

Signal Corps Proj. no. 581. Dept. of the Army Proj. no. 3-21-01-018.

TWO CHANNEL TELETYPE EQUIPMENT, by A. W. Poushinsky. Canada. Royal Canadian Air Force. Central Experimental and Proving Establishment, Rockcliffe, Canada. Apr 1952. 32p photos, drawings, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106817

This report is the result of laboratory tests of existing and proposed two channel landline teletype systems. RCAF development report, Final SIG 10H/1. Reference: AMTS Directive 9-49, dated 14 May 1949. File: 602-27-1. CEPE report 950.

Electronics

DEVELOPMENT AND APPLICATION OF BARIUM TITANATE CERAMICS AS NON-LINEAR CIRCUIT ELEMENT: FINAL REPORT UNDER CONTRACT NO. W36-SC-44606. Glenco Corp., Metuchem, N. J. Aug 1950. 54f photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.75, Enlargement Print $8.75. PB 106299

1. Ceramics, Barium titanate 2. Ceramics, Barium titanate - Electric properties 3. Ceramic - Dielectric properties 4. Barium compounds 5. Circuits, Electronic - Elements 6. SIG Contract W36-039-sc-44606, Final report.

For other reports on this contract see PB 104392, PB 104394, PB 104232.

DUST-CRYSTAL OPERATION FOR IMPROVED FREQUENCY STABILITY WITH VARYING TEMPERATURE, by Douglas A. Venn and George W. Arnold, Jr. U. S. Naval Research Laboratory. Nov 1951. 12p diagrs, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 106655

An investigation was made of the possibility of utilizing quartz-crystal oscillator plates having opposite temperature coefficients in such combinations as to provide, effectively, a unit possessing low thermal drift characteristics of not more than 0.0001 percent over a temperature range of 10° or 20°C. Such a unit would obviate the necessity for bulky oven control, now used where high stability is required of high-frequency crystal units. To attain these objectives, a simple theoretical analysis was made of the behavior of parallel crystals which lie in the lower portion of the high-frequency range (5 to 10 Mc) and experimental confirming data were obtained. A graphical method was evolved for qualitative analysis, applicable to both low- and high-frequency crystals in series or in parallel; and frequency-vs-temperature plots were prepared for individual crystals when operated in series. It was concluded that significant improvements in frequency stability can be achieved by use of quartz crystal combinations. A crystal unit can be obtained in this way which will be five to seven times better, over the temperature range of -30°C to +90°C, than the production crystals comprising the unit. Over the restricted temperature range utilized for temperature-controlled applications, improvements in stability of from ten to twenty times can be obtained. NRL R 3892.

MEASUREMENTS OF SOME LOW- AND VERY LOW-FREQUENCY ATMOSPHERIC NOISE IN THE ALASKAN AREA, by H. E. Dinger, W. E. Garner, and G. E. Leavitt. U. S. Naval Research Laboratory. April 1952. 28p photos, 1 fold, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.75. PB 106762

Atmospheric noise measurements were made on several low and very low radio frequencies in the Alaskan area during February 1951. Recordings were obtained using Radio Test Sets AN/URM-6 located at Adak, Kodiak, Nome, Fairbanks, and Point Barrow. Although atmospheric noise in the arctic is normally less than at lower latitudes, signal-to-noise ratios may be comparable because of the remoteness of the receiver locations with respect to sources of transmissions. Precipitation static, which occurred frequently at Nome, Adak, and Kodiak, was of sufficient intensity and duration to be considered a serious source of interference to communications. NRL R 3958.

MONOCHROMATOR ACTION OF A PAIR OF PARALLEL WIRE GRATINGS, by J. P. Casey, Jr. and E. A. Lewis. U. S. Air Force. Electronics Research Division. Antenna Laboratory, Cambridge Research Center, Cambridge, Mass. Apr 1952. 22p diagr, graph Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106861

The transmission of electromagnetic waves by a pair of wire gratings is treated as a boundary value problem, including oblique incidence, arbitrary separation between gratings, and ohmic losses. The electric vector is taken parallel to the wires, the wavelength being greater than twice the grating constant and much larger than the wire radius. Except when they are very close together, it is found that each grating can be regarded as a continuous, partially reflecting surface. On this basis the bandpass characteristics are described in detail. In a numerical example for a wavelength of 500 microns, it is shown that, although the resolving power is the same as with a pair of thin metallic films of the same reflectivity and separation, the peak transmission of the gratings is about 8000 times larger. AAF ERL E5086.

NEUES SYNTHETISCHES PIEZOELEKTRISCHES MATERIAL (NEW SYNTHETIC MATERIAL WITH PIEZOELECTRIC QUALITIES), by O. Macek. Mar 1949. 4p graphs (Text in German) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106950

1. Crystals, Piezoelectric - Synthetic - Germany 2. Barium titanate - Crystal structure - Germany.

From Frequenz, zeitschrift für schwingungs und schwachstromtechnik, bd. 3, nr. 3, Mar 1949, p. 84-86.

PROGRESS REPORT NO. XI ON O.N.R. CONTRACTS N5ORI-07801, N5ORI-07858. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Mass. May 1952. 74p photos, diagrs, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 106886

1. Dielectric research 2. Spectroscopy, Dielectric 3. Conductors, Semi - Ferromagnetic 4. Ferromagnetism - Research 5. Crystallography, X-ray 6. Crystals - Growth.

STUDY OF AUTOMATIC UNITIZED CIRCUIT TECHNIQUES. HERLEC CORPORATION, MILWAUKEE, WIS. FINAL ENGINEERING REPORT, JULY 1, 1948 THROUGH FEB 15, 1951, UNDER CONTRACT NO. W36-039-SC-38153. Feb 1951. 132p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $5.50, Photostat $17.50. PB 106942

The final report describes and summarizes the study and development activity aimed at the establishment of a system of electronic circuit fabrication, which would be automatic or semi-automatic in nature. Such a system, predicated on the 'Auto-Sembly' principle conceived at the Signal Corps Engineering Laboratories (SCEL), was evolved, based on the use of conventional types of electronic components, prefabricated (printed circuit) conductor patterns, and solder-dipping for mass single operation assembly of components to the pattern. The adaptability, versatility and practicability of the system was demonstrated by actual fabrication and test of a number of diverse electronic circuits repre-

senting the gamut of problems which any proposed new system would have to solve in order to be declared successful. The system proved to be easily applied after a number of process steps were satisfactorily developed. The report further details the basic steps of the developed system, called "Auto-Sembly", and elaborates on the pertinent physical and electrical characteristics of patterns, processing techniques and sources of supply of the various laminates, fluxes, solders, etc. Finally, an objective analysis of this new system is made for the purpose of establishing those features which warrant further development efforts. Specific recommendations with regard to components, materials and packaging are formulated which should lead to perfection of the system and increase in flexibility many-fold. "Etching systems for fabrication of conductor patterns for auto-sembly" in pocket on cover.

THEORY AND APPLICATIONS OF WAVE VECTORS, by Fredrik Dahlgren. 1951. 70p diagrs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 106871

A brief theory has been developed relating to a specific class of vectors, called wave rectors, defined as harmonic space wave components with a certain amplitude, phase position, and order in space, and a certain state of motion in time. Rules for the mathematical treatment of such vectors are given, as well as physical definitions of quantities which can be conveniently represented by wave vectors, these quantities mainly relating to electric machines. Some practical examples are demonstrated to illustrate the utilization of this particular vector theory within the region of rotating electric machinery. In this paper the practical points of view have been particularly emphasized, at the expense of the strict and general theory. As an example may be pointed out that the influence of iron saturation has been altogether left out. This influence can, however, be taken into account to a certain extent, although the practical applications will then involve considerable complications. For these questions reference is made to an earlier paper of the author: A general electromagnetic theory of electric machines, Ingeniörsvetenskapsakademiens Handlingar, nr 99, Stockholm 1930. The present paper contains a considerable extension and moderinization with regard to the previous paper but is somewhat less comprehensive as far as theory is concerned. Acta polytechnica 97 (1951) Electrical engineering series vol. 4, nr. 2. Also published as Kungliga Tekniska Högskolans Handlingar nr. 51.

TRANSFER CHARACTERISTICS OF A BRIDGED PARALLEL-T NETWORK, by Charles F. White. U.S. Naval Research Laboratory. Aug 1947. 50p diagrs, graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $1.25. PB 106744

The parallel-T resistance-capacitance null-type network together with a bridging and a re-tuning resistance when operated between suitably selected generator and load resistances exhibits a wide range of response characteristics. General formulas for the steady-state response of the network are derived and the effects of variation of the parameters relating to network symmetry, bridging resistance, generator resistance, and load resistance are shown by means of families of curves that serve as useful design data in the wide range of applications to which the parallel-T network may be applied. Used for frequency response control in servo systems employing amplitude-modulated carrier voltages for data transmission, the network provides carrier suppression and symmetrical sideband transmission of controllable characteristics with resulting system simplification. NRL R 3167.

VECTOR IMPEDANCE LOCUS PLOTTER, by J. F. Hersh and J. J. Faran, Jr. Harvard University. Underwater Sound Laboratory. Mar 1945. 21p photos, drawings (1 fold), diagrs, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106782

1. Bridges, Electrical control 2. Bridges, Impedance 3. Vacuum tubes, Cathode ray - Deflection systems 4. Impedance - Measurements - Equipment 5. Currents, Electrical - Impedance 6. Sound, Underwater - Interference 7. Solvers, Vector 8. Plotters, Graphic - Sonar 9. Transducers, Electromechanical 10. Vector impedance locus plotter (VILP) 11. OSRD 4954 12. NDRC 6.6.1.

OSRD 4954. National Defense Research Committee, Division 6, Section 6.1, sr. 287-175. This equipment was developed by the Electrical Measurements Section of HUSL Transducer Group and forms a part of the work carried on under the Harvard-OSRD Contract OEMsr-287. The Vector Impedance Locus Plotter (VILP) was developed by J. F. Hersh and J. J. Faran, Jr., who also prepared this report. Suggestions which contributed materially to the progress of the project were made by R. B. Payne, J.R. Reitz, F. V. Hunt, and C. W. Horton.

Miscellaneous

NEW HIGH-SPEED CATHODE-RAY TUBE, by Harold J. Peake and Robert W. Rochelle. U. S. Naval Research Laboratory. Apr 1952. 12p photos, diagrs, graph Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.50. PB 106746

A cathode-ray tube, DuMont type K1056 has been developed to fulfill the need for simplifying the recording of transient waveforms that require spot velocities of 3,000 in./μ sec and higher. The K1056 was developed jointly by the Vacuum Tube Division of the Allen B. DuMont Laboratories, Inc., and the Naval Research Laboratory. The evolution of the K1056 design required consideration of such design parameters as tube-envelope dimensions, electrode connections, deflection-plate configuration, screen-phosphor type, screen thickness, and sizes and spacings of beam-forming elements. The effects of spurious screen illumination and transit time were determined experimentally. Full information on the characteristics (operating voltages, interelectrode capacitances, etc.) is presented. Typical operating voltages are 7.5 kilovolts on the second anode and 30 kilovolts on anode three. To judge the performance of a cathode-ray tube, it was necessary to devise a figure of merit that is numerically equal to the resolution of the screen display. Sample photographs of K1056 traces show sine waves with frequencies of 200, 6,500, and 10,000 megacycles. NRL R 3954.

Food and Kindred Products

CAKES AND BISCUITS. REPORT OF A VISIT TO THE U.S.A. IN 1951 OF A PRODUCTIVITY TEAM REPRESENTING THE BRITISH CAKE AND BISCUIT INDUSTRIES. Anglo-American Council on Productivity. Apr 1952. 92p photos, map, drawings Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.15. PB 106455

1. Bakers and bakeries.

COMMERCIAL STORAGE OF VEGETABLES. PART I: GENERAL. PART II: BROCCOLI AND CAULIFLOWERS. PART III: CARROTS (MAIN CROP). Gt. Brit. Dept. of Scientific and Industrial Research. 1952. 12p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.15. PB 106877

1. Vegetables - Storage - Gt. Brit. 2. Broccoli - Storage - Gt. Brit. 3. Cauliflower - Storage - Gt. Brit. 4. Carrots - Storage - Gt. Brit. 5. DSIR FI L15.

S. O. Code no. 47-156-15.

GRAIN STORAGE, DRYING AND MARKETING IN THE UNITED STATES OF AMERICA. GT. BRIT. MINISTRY OF AGRICULTURE AND FISHERIES. REPORT OF A MISSION JULY-SEPTEMBER, 1951. 1952. 42p photos, maps, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.40. PB 106884

1. Grain storage 2. Grain - Processing 3. Grain - Handling 4. Grain elevators 5. Cereals - Manufacture 6. Wheat - Processing 7. Rice - Processing.

S. O. Code no. 24-212.

INSECT INFESTATION OF STORED FOOD PRODUCTS IN NIGERIA, REPORT OF A SURVEY 1948-50 AND OF CONTROL MEASURES ADOPTED. Gt. Brit. Colonial Office. 1952. 48p photos, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 106874

1. Damage, Insect - Nigeria 2. Insect control - Research - Nigeria 3. Food - Storage - Nigeria.

Colonial research publication no. 12. S. O. Code no. 88-335.

TYPE B-3 ELECTRICALLY HEATED FOOD-WARMING OVEN, by Joshua D. Chatham, Billy L. Guy and Harry C. Dyme. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1951. 47p photos, graphs (3 fold), tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106832

1. B-3 (Electrical food-warming oven) 2. Stoves, Electrical 3. Food rations, Inflight 4. Maxson food systems 5. Containers, Food - Tests 6. IF (Canned meats) 7. MAPCO (Mansfield Aircraft Products Company) 8. AAF TSEAA MR 691-5A.

Memorandum report no. WCRDF-691-5A. Appendix I. Final report on operational suitability tests of ovens, hot food, type B-3 (Project no. APG/SAB/9-A) by Caswell Grave, II. - Appendix II. Graphs. See also Project no. APG/SAB/8-A (PB 106284).

Fuels and Lubricants

EVALUATION OF X-RAY METHODS FOR THE QUANTITATIVE DETERMINATION OF TETRAETHYLLEAD IN AVIATION GASOLINE, by Jack T. Humphries. U. S. Air Force. Wright Air Development Center. Research Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1951. 18p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106801

A brief description of the x-ray absorption and fluorescence methods for the determination of tetraethyllead is given. Samples of aviation gasoline, Specification MIL-F-5572, were tested with each method and the results are included in the report. These results indicate that the fluorescence method is applicable to the need of the Air Force for a rapid, accurate analysis. The absorption method does not give the desired accuracy. The methods of sample preparation and the arrangement of equipment are described. It is found that an x-ray fluorescence analysis for tetraethyllead content requires approximately eight minutes, a feature which makes the x-ray analysis much more desirable than the usual chemical method. AAF TR 6520.

SURFACE CHEMICAL PHENOMENA IN LUBRICATION, by J. E. Brophy and W. A. Zisman. U. S. Naval Research Laboratory. Jun 1950. 29p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 103774

1. Surfaces - Absorptive properties 2. Surface active agents - Research 3. Metal surfaces - Lubrication 4. Lubricants - Viscosity 5. NRL R 3680.

TALL OIL REFINING, by Ake Linder. 56p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 106869

This paper has been written with the intention of presenting a description of various refining processes recommended for tall oil refining in the course of almost 50 years. Special prominence is given to methods that have found application in industrial fields. Among the many methods suggested, those which are based on distillation, possibly combined with centrifuging of rosin acids, are by far the most important. Distillation technique has been developed enormously within the last 10 years and has rendered possible the separation of substances, even in practical application, which earlier has been considered unfeasible. Thus the way has been opened to the production, by distillation alone, of pure fatty acids and rosin acids from tall oil. Operating costs of distillation processes have proved generally

cheaper than other physical and chemical methods. Therefore, it can be safely maintained that refining processes based on distillation will remain predominant, especially as other methods do not yet permit the production of pure fatty acids and rosin acids by other means than in combination with distillation. The availability of tail oil is, however, limited by the extent of sulphate pulp production which, in its turn, is dependent on the supply of suitable wood. In Europe all tail oil is already utilized and refined and further development depends on better yields in the production of refining of tail oil together with more high-quality products. Acta polytechnica 95 (1951) Chemistry including metallurgy series vol. 2, nr. 10. Also published as Ingeniörsvetenskapsakademiens Handlingar nr. 207.

Highways and Bridges

REPORT OF THE ROAD RESEARCH BOARD WITH THE REPORT OF THE DIRECTOR OF ROAD RESEARCH FOR THE YEAR 1950. Gt. Brit. Dept. of Scientific and Industrial Research. Road Research Board. 1952. 97p photos, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 106876

1. Roads - Research - Gt. Brit. 2. Road materials - Research - Gt. Brit.
S. O. Code no. 47-98-0-50.

SALVAGING OLD PAVEMENTS BY RESURFACING, BY ROBERT H. TITTLE. PRESENTED AT THE THIRTIETH ANNUAL MEETING, JANUARY 9, 1951. Highway Research Board. 1952. 43p photos, tables Available from Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. $.60. PB 106890

Bulletin 47 discusses methods of resurfacing deteriorating pavements with portland-cement concrete and with bituminous materials and gives examples of resurfacing methods and procedures. This bulletin also discusses the basic considerations involved in resurfacing and outlines a method of approach to the formulation of a rehabilitation program. The bulletin contains 39 pages of text and numerous illustrations showing methods of widening, preparing surfaces, and resurfacing together with before-and-after views of resurfaced pavements; the bulletin also contains two appendices, one including the definition of bituminous pavements according to federal classification and the other listing definitions of terms used in pavement-condition surveys. Contents: Appendix A: Definitions of bituminous pavements according to federal classifications. - Appendix B: Definition of terms for pavement condition surveys. Publication 215. HRB BUL 47.

Instruments

THE DESIGN AND DEVELOPMENT OF A NEW FIVE STAGE CASCADE IMPACTOR. INTERIM REPORT, by James D. Wilcox. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Mar 1952. 16p drawing, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106781

1. Aerosols - Particle size - Measurement 2. Sampling devices 3. Impactors, Cascade 4. Hodges impactor 5. Cloud chambers - Design 6. Trajectories - Particle 7. CC CRL IR 92. Project 4-12-10-001.

ELECTRICAL TECHNIQUES FOR COMPENSATION OF THERMAL TIME LAG OF THERMOCOUPLES AND RESISTANCE THERMOMETER ELEMENTS, by Charles E. Shepard and Isidore Warshawsky. U. S. National Advisory Committee for Aeronautics. May 1952. 88p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106946

Basic electrical networks are described that compensate for the thermal time lag of thermocouple and resistance thermometer elements. For a given set of operating conditions, networks requiring no amplifiers can provide a thirtyfold reduction in effective time lag. This improvement is obtained without attenuation of the voltage signal, but does result in a large reduction in the amount of electric power available because of an increase in the output impedance of the network. Networks using commercially available amplifiers can provide a thousandfold reduction in the effective time lag without attenuation of the alternating voltage signal or of the available electric power, but the improvement is often obtained at the expense of loss of the zero-frequency signal. The completeness of compensation is limited by the extent of off-design operation required. NACA TN 2703.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 1ST-2D, JUNE 28 TO AUG 28, 1946, by L. R. Jackson, A. E. Middleton, and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Jul-Aug 1946. 19p diagr, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106911

Outlines general phases of the investigation. Contract W33-038-ac-15173 (16524). Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 3D, AUG 28-SEP 28, 1946, by L. R. Jackson, A. E. Middleton, and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Sep 1946. 29p graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106912

This report is the third interim report on the development of high-stability fixed composition resistors capable of high-temperature operation. The project includes a literature survey, a theoretical study of materials suitable for resistance elements, and the development of resistors with wattage ratings of 1/4 to 2 watts, which will operate at high ambient temperatures of 200°C. (392°F.) without derating or chang-

ing of resistance. Contract no. W33-038-ac-15173. Pages 14-41. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 4TH, SEP 28 TO OCT 28, 1946, by L. R. Jackson, A. E. Middleton and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Oct 1946. 45p drawing, graphs, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25.
PB 106913

German relative material has been reanalyzed spectrographically. It was observed that no zinc was present in the resistive element. The film is apparently pure carbon. Through corrections with an article by C. L. Snyder, verification that the German carbon film had been applied by pyrolysis was obtained. The base material of the German resistor is composed of 50-80% SiO_2, 10-20% Al_2O_3, 5-15% K_2O, 0.5-5% Na_2C, 0.5-5% CaO, and 0.1-5% Fe_2O_3 and traces of Cr_2O_3, MnO, PbO, TiO_2, B_2O_3, MgO, SnO, and CuO. High-temperature tests on a representative batch of U. S. resistors, have been completed. Contract W33-038-ac-15173. Pages 42-85. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 5TH, OCT 28-NOV 28, 1946, by L. R. Jackson, A. E. Middleton, and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Nov 1946. 33p photo, diagr, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00.
PB 106914

Porcelain rods on which pyrolytic carbon films were deposited last month have been sectionel, and resistors made from the most uniform pieces. The production of resistors has entailed a comprehensive study of electrical contacts to carbon. Metal paint contacts, inclusive of palladium, gold, platinum, and silver resinates, have been baked on carbon to eliminate the resinate and produce a thin film metal contact. In addition, electroplated copper contacts have been applied. Experimental types of resistors, including some with the several contacts mentioned above, were studied by, (a) temperature versus resistance tests, similar to those applied to standard resistors, which were discussed in previous reports (room temperature to 204°C. (400°F.)), (b) wide-range wattage tests, and (c) standard tests to determine the temperature of failure. Results showed that (1) the correct choice of contact materials and their method of application are a very important part of the problem of obtaining high-stability resistors, (2) the same temperature coefficient of resistance, indication of stability, and temperature of failure (240-265°C., (464-509°F.) were obtained for these experimental resistors as were observed for German resistors, and (3) the room-temperature discrepancy between the ohmeter and load resistances, previously observed and also noted here, is a voltage effect. Metallographic methods, X-ray diffraction examinations, and certain electrical tests have been investigated to recognize what aid they can give in determining the optimum conditions for production of high-stability high-temperature operating resistors. A theoretical discussion of the Hall effect has been given. In these preliminary studies it was observed that (1) pyrolytic carbon has a very small grain size, is very hard, and cannot be readily polished, (2) the film thickness can be measured by microscopic methods, (3) X-ray examinations will require base materials which do not have spectral lines conflicting with those of carbon, and (4) the Hall effect of pyrolytic carbon films is measurable. Contract W33-038-ac-15173. Pages 86-116. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 6TH, NOV 28 TO DEC 28, 1946, by I. R. Jackson, A. E. Middleton, and R. I. Davis. Battelle Memorial Institute, Columbus, Ohio. Dec 1946. 23p graphs (part fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 106915

Experimental resistors with values from 20 to 560 ohms, inclusive, of (1) some with carbon films deposited at different temperatures /900-1100°C. (1652-2012°F.)/, (2) some with Pt, Pd, Au, and Cu electrical contacts, and (3) some with Porcelain I and II bases, have been studied. Tests have consisted of (1) observation of the carbon-film resistance variation over the temperature range from room temperature to -100°C. (-148°F.), in some cases to -150°C. (-238°F.); (2) 24-hour-life tests at 204°C. (400°F.) under rated loads; and (3) wide-range wattage tests. Effects of the types of variations noted above are apparently less than the amount of fluctuation produced by the rough, experimental character of these resistors. However, tentative indications have been obtained (1) the Porcelain II rods provide greater stability of the resistance during life and temperature tests, and (2) the type of electrical contact determines the sign and percentage separation of the ohmmeter and load resistance. Data obtained from the best experimental resistors showed that (1) an effective temperature coefficient of resistance of .00024°C. existed over the temperature range from -90 to 240°C. (-130 to 464°F.) under rated load. Comparison of these results with the requirements of the contract have shown that these resistors satisfy the requirements of stability and high- and low-temperature operation. Spectroscopic analyses of Siemens-Halske and Battelle Memorial Institute porcelain bases have been compared showing that the same ingredients are present in both cases, but there is a great difference in the amount of TiO_2 and K_2O present in the two porcelains. In addition, a greater amount of Al_2O_3 was found in the Battelle Memorial Institute bases. Contract W33-038-ac-15173. Pages 117-135. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 7TH,DEC 28, 1946 TO JAN 28, 1947, by I. R. Jackson, A. E. Middleton, and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Jan 1947. 26p fold graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 106916

Experimental resistors with values up to 2 megohms have been produced by controlling the carbon film thickness and employing spiraling techniques. Standard electrical tests have been conducted on a group of resistors involving thin, thick, and spiraled carbon films. Results of the tests, when analyzed, have shown that the chief causes of instabilities in the pyrolytic carbon film resistor characteristics, resulting from operation over the required range of temperature and under life test conditions, are geometrical variations in the conducting path through the resistor. Through the observations that instabilities are functions of geometrical variations, it is evident that the fundamental characteristics of pyrolytic carbon films will satisfy the requirements of the subject contract. Definite lines of attack have been established for the purpose of achieving the optimum conditions in experimental resistors in regard to minimization of the variance of the geometry of the conducting path during testing. An outline of this new phase of work has been given. In addition it has been observed that (1) Porcelain I rods have variable radii and are not easily spiraled, (2) red coatings on Siemens-Halske resistors will not withstand high-temperature treatment, and (3) carbon particle size in pyrolytic carbon films is about 100 angstrom units. Contract W33-038-ac-15173 (16524). Pages 136-156. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 8TH, JAN 28-FEB 28, 1947, by L. R. Jackson, A. E. Middleton, and R. L. Davis. Battelle Memorial Institute, Columbus, Ohio. Feb 1947. 26p diagr, fold graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106917

The fundamental principles behind the designing of a pyrolysis system which will produce uniform films and allow sensitive control of film deposition are discussed, and the basic design for a new pyrolysis system now under construction is given. The objectives of the newly organized ceramic program are discussed in relation to film uniformity studies. A new ceramic base has been obtained for which rather complete data on properties and method of production are known. This base has been used in the preparation of experimental resistors. By comparison of the properties of these resistors to those discussed in previous reports, it was found that life test and temperature versus resistance trends are similar, but absolute resistance values for the other resistors processed in similar manner are somewhat higher. This difference has not yet been attributed to any one specific factor. Through potentiometrically measured Hall constants and resistivities and supplementary microscopic examinations to determine the film thickness on a series of carbon films of controlled thickness, it was shown that: (1) the type of ceramic surface is extremely important to producing predetermined resistance values and providing stability of the temperature versus resistance characteristics, for one set of film-processing conditions; (2) carbon films have a highly distorted structure, since the measured mobility of the current carriers is about 1 $cm.^2$/volt sec.; (3) the Hall constant of carbon films is definitely measurable and reliable; and (4) the true carbon film thickness cannot be determined microscopically when films are deposited on rough surfaces. Contract W33-038-ac-15173. Pages 157-181. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 9TH, PERIOD FEB 28-MAR 28, 1947, by L. R. Jackson, A. E. Middleton, R. I. Davis, N. L. Haldy, H. Z. Schofield, and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Mar 1947. 30p fold diagr, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106918

The dynamic type of pyrolysis system which was described in the last report has been constructed and tested in regard to (1) temperature conditions at various points in the furnaces, (2) requirements on the several variables in order to produce carbon films, (3) uniformity of film resistance over the length of a six-inch rod, and (4) rate of production of the rods. Results have shown that very good uniformity of resistance over the length of a porcelain rod can be achieved with this system. However, it is necessary that the temperature at the hydrocarbon jets be the same temperature or close to that of the preheating furnace. The time to process one rod is reduced by a factor of eight compared to the time to process a rod in the former static system. It has been shown that the resistance of the carbon film increases with heat treatment during air baking the contacts on the carbon at 370°C. (698°F.). A literature survey has revealed extensive data on various types of electrical insulating ceramics. Several different ceramics are discussed. It is evident that expansion coefficients varying from 1 to 9 x 10^{-6}/°C. can be achieved by different ceramic bases. Wide variations in types of materials, including alumina, magnesia, zirconia, titania, and silica, exist in the porcelains discussed here. Extrusion apparatus is currently being constructed, and several of the ceramics discussed in the literature survey are being prepared. Contract no. W33-083-ac-15173. Pages 182-207. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 10TH, PERIOD MAR 28 TO APR 28, 1947, by L. R. Jackson, A. E. Middleton, R. I. Davis, N. L. Haldy, H. Z. Schofield and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Apr 1947. 27p diagrs, graphs (1 fold) tables (1 fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106919

Work has consisted of a continuation of the several phases of study reported last month. Designs of accessory parts for the pyrolysis system have been completed and have been submitted for construction. The new pyrolysis system in its partially completed state has been used to preliminarily test two types of hydrocarbon jet systems, effects of the velocity of ceramic rods through the hydrocarbon vapor, and effects of the pressure of the hydrocarbon vapor on the type of film obtained. Du Point, over-dry, 4760, silver composition has been successfully baked on carbon films in nitrogen atmospheres at tempera-

tures ranging fron 370 to 680°C. (698 to 1256°F.). Temperatures up to this maximum value in nitrogen atmospheres will not deleteriously effect the carbon film. Resistance versus temperature tests over the temperature range from 20 to 410°C. (68 to 770°F.) in nitrogen atmospheres and heat treatments of carbon films in air to 500°C. (932°F.) have indicated that (1) the deviation in resistance as a function of time at high temperatures /200°C. (392°F.)/, encountered in former tests, made in air, is probably caused by combustion of the carbon film, (2) the carbon film is completely burned off through heat treatments for 30 minutes in air at about 440°C. (824°F.), (3) only six per cent variation in resistance of a carbon film is apparent between room temperature and 410°C. (770°F.) in a nitrogen atmosphere and reproducibility of room-temperature resistance before and after such treatment is excellent. Therefore, it appears that a suitable protective coating applied to the carbon film will allow extending the limit of high-temperature operation and will eliminate slow aging effects which are apparent in long-life tests at 200°C. (392°F.). Results of Wright Field humidity and high-temperature life tests on B.M.I. experimental resistors are given. Data are presented on the preparation of steatite and cordierite ceramic bodies. Data also are given on the fabrication, burning, and surface treatment of specimens made from normal and alumina modified electrical porcelain bodies and from a high alumina body. A description of the apparatus employed in the extrusion of ceramic specimens is given. Contract W33-038-ac-15173 (16524). Pages 208-229. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 11TH, PERIOD APR 28 TO MAY 28, 1947, by L. R. Jackson, A. E. Middleton, R. L. Davis, N. L. Haldy, H. Z. Schofield, and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. May 1947. 31p diagrs, tables (1 fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106920

A brief account of progress with the new pyrolysis system is given. Further tests in nitrogen atmospheres have demonstrated (a) 6 hours at 750°C. (1382°F.) does not change the resistance of the carbon film by large amounts —the change that occurs is a decrease; (b) small air leaks are sufficient to destroy the carbon films. Five types of commercial protective coatings have been applied to carbon-coated rods and then subjected to baking at 225°C. (437°F.) and 275°C. (527°F.). All coatings except Horn's aluminum high-resistance paint (brushed on), failed this test owing to cracking, peeling, poor adherence or flow. Rods of cordierite, normal, and low-loss steatite have been extruded. It appeared that dispersion of water by mechanical, rather than manual means, improved extrusion characteristics in these cases. Proper maturing of alumina-modified porcelain and low-loss steatite bodies was found to occur at about 2325°F. (1274°C.). Measurements of the thermal coefficients of expansion of normal and alumina-modified porcelain bodies have been made. Values for both were approximately 5 x 10^{-6} cm./cm./°C. The surface characteristics of these bodies have been varied from a vellum type to a sandpaper type by various etchings in hydrofluoric acid. Some important literature is reviewed, and comments are made on the reflections on the present program. G-1080-2. Contract no. W33-038-ac-15173. Pages 230-255. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 12TH, PERIOD MAY 28 TO JUNE 28, 1947, by L. R. Jackson, A. E. Middleton, R. L. Davis, N. L. Haldy, H. Z. Schofield and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Jun 1947. 33p drawings, fold diagr, graph, fold tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106921

The automatically controlled dynamic pyrolysis system for coating carbon films on porcelain bases has been assembled. Automatic controls have been installed for controlling (1) the entrance and exit of the porcelain rods from the system, (2) the release of the hydrocarbon vapor into the cracking chamber, and (3) the temperature of the furnaces. Gate valves have been built into the system to allow reloading the rod feeder and extracting coated rods without opening up the entire system to air. Calibrations and preliminary tests of the several parts of the system have been started. Several failures, discussed in the report, have deterred completion of these tests. Experimental resistors consisting of carbon-coated porcelain rods with silver end contacts and flat nickel pigtails have been coated with several types of protective coatings. Two silicone paints were included among the coatings tried. Heat treatments at 230°C. (445°F.) in air were applied to these resistors. After 130 hours, it was noted that a considerable increase in resistance of each resistor had occurred. Porcelain and other bodies including the alkaline-earth porcelain, a Bell Laboratory development, having been prepared for future use as base rods of experimental carbon resistors. Methods of preparation are given in the report. Contract no. W33-038-ac-15173 (16525). Pages 256-277. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORTS, 13TH, PERIOD JUNE 28 TO JULY 28, 1947, by L. R. Jackson, A. E. Middleton, R. L. Davis, N. L. Haldy, H. Z. Schofield, and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Jul 1947. 30p tables (2 fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106922

Information on the research, development, and production of precision-type carbon-deposited resistors, which were carried on at Bell Telephone Laboratories and Western Electric during the recent war, is presented. The possibilities that the carbon-deposited resistor will meet the specifications of this project are discussed in the light of this information. Continued tests on the new pyrolysis system have revealed that the present system is subject to leaks. In view of this experimental observation and definite verification from the Bell Telephone Laboratories conference that almost total exclusion of oxygen is required in controlling carbon deposition, steps have

been taken to revamp all the connections of the system to make them vacuum and pressure tight. It has been demonstrated that the five types of protective coatings currently being investigated fail because of pinholing or diffusion of oxygen through the coating. There does not appear to be any mechanical interaction between the coating and the carbon in view of the observed stability of the resistance of each resistor during approximately 100 hours' operation at 255°C. (435°F.) in nitrogen atmosphere. Studies of the possibilities of zircon and titania ceramics meeting the requirements for a carbon-deposited resistor ceramic base have been initiated. Burning tests to determine the proper maturing temperature, have been conducted on the Bell Telephone I aboratories alkaline-earth ceramic body and three other bodies. The coefficients of linear thermal expansion of three of the ceramic bodies currently being investigated have been determined: high alumina, P-13(3-1), 7×10^{-6}/°C., P-8, alkaline earth porcelain, 3.6×10^{-6}/°C., and P-9, cordierite, 2.9×10^{-6}/°C., in the temperature range 20 to 500°C. Contract no. W33-038-ac-15173. Pages 278-301. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 15TH, PERIOD AUG 28 TO SEP 28, 1947, by I. R. Jackson, A. E. Middleton, R. L. Davis, N. I. Haldy, H. Z. Schofield and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Sep 1947. 41p photos, drawings, fold diagr, fold tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106923

A complete description of the automatic pyrolysis system is given. In addition, a summary of pertinent information on the entire list of ceramic bases, which have been investigated, is included. Continuous operation of the automatic pyrolysis system for a period of ten days has yielded new results on the compatibility of various features of the design of this system versus operational stability. Instability of the pressure in the system, failure of the jet system, lack of a suitable way of determining the ceramic rod temperature during processing, and failure of the rod-ejecting mechanism were the main defects noted during this period. The effects of these defects were reflected in the inconsistent characteristics of the carbon-coated rods obtained during these operations. Corrections for the purpose of eliminating the above defects have been incorporated into the system. At the time of writing this report, the system is once again ready to be tested. The surface and extrusion characteristics of the alkaline-earth, titanate, and zircon bodies were improved by varying the plasticizing additions to these bodies. A discussion of further work on burning ceramic bodies in a hanging position is also given. Poor temperature distribution appears to be the cause of varying porosity within bodies burned in this position. G-1080-1-2. Contract W33-038-ac-15173 (16525). Contains a description of the automatic pyrolysis system. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 16TH, PERIOD SEP 28 TO OCT 28, 1947, by L. R. Jackson, A. E. Middleton, R. L. Davis, W. E. Few, N. L. Haldy, H. Z. Schofield, and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Oct 1947. 43p photos, fold tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106924

A marked improvement in the vacuum stability, hydrocarbon control, and automatic operation of the carbon-coating unit has been achieved through numerous changes in the pyrolysis system. The rod-kicker mechanism now operates consistently. The ceramic rod temperature has been measured during coating and proven to be practically constant. Asymmetrical feeding of the hydrocarbon gas to the passing rod from a single jet has been found to be satisfactory for producing uniformity of the carbon film around the rod. Drying agents in various portions of the system, degassing at operating temperature for 72 hours, elimination of rubber connectors, reducing vacuum and hydrocarbon line lengths and increasing the furnace temperature to 1850°F. (1010°C.) have produced conditions which allow (a) rapid reduction of system pressure between runs, (b) an over-all vacuum stability, (c) greater efficiency in carbon film production, (d) the ability to meter the hydrocarbon gas, and (4) production of carbon films from methane gas. The machine which has been constructed for grooving the carbon-coated rods has been roughly tested. Grooves with six different pitches can be made at the present time with the accessory equipment available. The cutting wheel is invested with the unique ability of being able to follow the contours of the rod surface regardless of its eccentricities. Tests showed that deep cuts produced jagged edges and the springs in the machine were not suitable for following the rod contours. A zircon-porcelain body with excellent surface characteristics has been produced. Burning tests on ceramic bodies have shown that the optimum burning temperature of a particular body varies according to methods of preparing the body and the method of supporting the specimen in the kiln. Contract no. W33-038-ac-15173. Pages 354-389. Appendix is Siemens-Halske resistor bases: Porcelain for carbon resistors (Carbowid porcelain) by Dr. B. C. Weber. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 17TH, PERIOD OCT 28-NOV 28, 1947, by I. R. Jackson, A. E. Middleton, R. L. Davis, W. E. Few, N. L. Haldy, H. Z. Schofield and C. R. Austin. Battelle Memorial Institute, Columbus, Ohio. Nov 1947. 49p drawings, diagr, graphs, tables (part fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106925

This report presents the results of (a) an extensive investigation of carbon-coating control, (b) an analysis of carbon-film characteristics, (c) preliminary developments in regard to end caps, end contacts, and end-cap attachment on the resistor element, (d) some tests on completed resistor units, and (e) some investigations related to development of ceramic bases. G-1080-1-2. Contract W33-038-ac-15173 (16525). Pages 390-433. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 20TH, PERIOD JAN 28-FEB 28, 1948, by A. E. Middleton, R. L. Davis, W. E. Few, O. J. Mengali, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Feb 1948. 32p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106926

The changes in the pryolysis system, which were prescribed by the results discussed in the eighteenth interim report, have been made. The new and old designs of the hydrocarbon source, valve controls, jet systems, and mechanical supports for the preheating chamber are discussed. The new hydrocarbon source is a radial change from the previous one. In this case the hydrocarbon liquid is controlled by the valve system. The former single jet has been replaced by a three-way jet. The unfortunate failure of the globar elements, which induced temperature nonuniformity in the system over an appreciable time prior to failure, has prevented full evaluation of the above changes. However, it appears that the following improvements have been made, (1) finer and wider range control of reproducibility of the carbon coating resistances, (2) a reduction in the variation of resistance along the length and around the coated rods, and (3) elimination of the time element, in regard to turning on the hydrocarbon vapor, from affecting resistance values for one set of prescribed coating conditions. In addition, it has been noted that P-1, P-8, P-10, and P-2 ceramic bases receive different resistance coatings under the same prescribed conditions of coating. Two possible explanations for this difference are given. G-1080-2. 20th interim report on Contract W33-038-ac-15173 (16525). Pages 484-512. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 21ST, PERIOD FEB 28 TO MAR 28, 1948, by A. E. Middleton, R. L. Davis, B. Brand, O. J. Mengali, E. R. Mueller, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Mar 1948. 30p tables (1 fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106927

One hundred and five resistor units with values ranging from 2400 to 3800 ohms have been prepared according to the general specifications discussed in the nineteenth interim report. These resistors were dip coated with seven commercial high-temperature protective coatings, thus giving 15 resistors for each of the seven coatings. Each type of coating was applied in one, two, and three coats to subgroups of five resistors in each group of fifteen. Each resistor was tested at room temperature at various points during processing, including (a) after applying the silver contacts, (b) after attaching the end caps, and (c) after dip coating with the protective paint. All the resistors were subjected to 250°C. (480°F.) in helium for 72 hours and subsequently in air at the same temperature and for the same period of time. Resistance measurements were made after each test. The test data on coated resistors have shown that (1) some of the protective coatings are capable of providing satisfactory protection against air oxidation, and (2) most of the resistors failed owing to: (a) Mechanical failure of the end contact, resulting from poor adherence of the silver and carbon, removal of the silver by the hot solder, and the mechanical torque on the silver-to-carbon junction during crimping the end cap; (b) Cracking, blistering, and peeling of the protective coatings, which became very pronounced for three coats and was greater for some types of coatings than others. In addition, it was noted that failure was more pronounced for single coatings than double coatings. This has been tentatively explained by the possibility greater amount of pinholing. It appears that improvement of the silver-to-carbon contact and use of coatings, such as A. C. Horn aluminum or black types, should give a stable resistor which can be used in determining the optimum type of ceramic base and the preferred method of carbon-coating production. G-1080-2. 31st interim report on Contract W33-038-ac-15173 (16525). Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 22D, PERIOD MAR 28 TO APR 28, 1948, by A. E. Middleton, R. L. Davis, B. Brand, O. J. Mengali, E. R. Mueller, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Apr 1948. 27p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106928

The need for development of a strongly adherent, low band resistance, silver-film end contact for the present experimental carbon film resistor was recognized last month. The statement made in German literature that silver oxide urea-aldehyde compositions were successfully used in producing end contacts was used as a basis for new developments. A series of studies of silver oxide urea-aldehyde compositions, using xylene and butyl alcohol as a thinner, had shown that a strongly adherent, low band resistance, silver film can be applied to the carbon film in a helium atmosphere at temperatures between 400 and 500°C. (750 and 930°F.) without deleteriously affecting the carbon film. In attempting to develop this composition for end contacts, studies of (a) effects of baking atmosphere, (b) temperature of baking, (c) amount of the silver oxide in the solution, (d) effect of the type of urea, (e) effect of drying time before baking, (f) effect of cleansing the carbon film surface in various ways, (g) effects of method of application, and (h) effects of pretreatments of the silver oxide, have been studied. As a result, progress has been made to an extent that a preferred processing schedule has been developed, which will give a continuous band, strongly adherent silver film. This end contact is shown to have greater resistance stability during processing a resistor than the chemically reduced sprayed silver films. During the process of developing this more strongly adherent end contact, it has been recognized that the ceramic-carbon adherence of the availalbe coated rods is highly variable. G-1080-2. 22d interim report on Contract W33-038-ac-15173 (16525). Pages 538-561. Reports on this contract are PB 103436, 103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 23D, PERIOD APR 28 TO MAY 28, 1948, by A. E. Middleton, R. L. Davis, O. J. Mengali, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. May 1948. 25p drawings, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106929

Previously, tests and testing equipment required in the development of carbon-film resistors have been general and simple. Tests have included ohmmeter, wattage, temperature versus resistance, and life tests at various temperatures in air and inert atmospheres. The equipment has been improvised and only capable of handling two resistors at a time. At the present stage of the work, it has become a necessity to accurately test larger numbers of partially and completely processed resistors in the number of ways outlined in Table 40 of the 19th Interim Report A tester which meets the present and future needs has been designed. This apparatus is fully described in this report. It will be capable of (a) measuring all sizes of resistors in regard to resistance, wattage rating, and physical dimensions, (b) being readily adapted for all tests outlined in the contract, including wide-range temperature tests, noise tests, load-life tests, humidity or salt-water tests, and wattage tests, and (c) giving accurate data on temperature and resistance of the resistor. The tester will contain 12 individual A. C. power supplies in order to accommodate 12 resistors of any value or wattage range. Although it will contain a large number of switching systems, inspection shows that this complication still leaves the tester a more simple, more versatile, and more accurate system than if only two power supplies were used. The resistor-holder unit is designed for a wide range of operation conditions. The resistor surroundings will consist of a suitable oil in order to efficiently control oxidation and temperature. G-1080-2. 23d interim report on Contract W-33-038-ac-15173 (16525). Pages 562-583. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 24TH, PERIOD MAY 28 TO JUNE 28, 1948, by A. E. Middleton, R. L. Davis, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Jun 1948. 15p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106930

Owing to the recognition that variations in the carbon-film adherence to the ceramic base were complicating the data from studies of the silver-oxide-urea-aldehyde type of silver films, investigations of carbon adherence and the relationship of silver and carbon adherence have been made. The present studies have included classifying surface roughness and carbon adherence of a large number of carbon-coated rods. Matching the roughness of emery papers and carbon surfaces by microscopic methods, and masking-tape stripping tests were used to make these classifications. Comparisons of silver and carbon adherence were made by scraping the silver films with a knife blade and comparing the results with the classification given by the stripping test. Using these methods, some properties of Battelle and German resistors have been compared. Results have shown an over-all improvement in carbon adherence among the inventory of coated rods, which was coincident with improvements in the pyrolysis system and ceramic bases. No correlations of adherence with specific conditions of operation of the pyrolysis system were noted. However, it was apparent that greater uniformity and roughness of the ceramic surfaces tended to give better carbon-film and silver-film adherence. No difference in carbon adherence to alumina-modified, normal and alkaline earth porcelains was noted. Stripping tests can be used with fair assurance that those rods passing this test will not show combined silver and carbon peeling, thus reducing the complications in studies of silver films. Analysis has shown that silver-appearing end contacts on German resistors are pure silver. The outstanding difference between Battelle and German silver films is apparently the texture of the film; the Battelle films having foil-like properties and the German films being very pliable. G-1080-2. 24th intermin report on Contract W33-038-ac-15173 (16525). Pages 584-595. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 26TH, PERIOD JUL 28 TO AUG 28, 1948, by A. E. Middleton, R. L. Davis, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Aug 1948. 19p fold graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106931

Comprehensive laboratory test data on eleven completed resistors are presented. Types of resistance tests included (a) room-temperature load variations, (b) temperature variations up to 200°C. with one-watt loads, (c) load life tests, and (d) humidity tests. Incomplete data suggest that the improved silver oxide-urea aldehyde-silver end contact may be superior to end contacts of similar types prepared formerly. Variations in processing are evaluated in terms of data on the completely assembled resistors. The results, inadequate for statistical interpretation, suggest directions for future effort. Oxidation effects on carbon-film resistance, especially prevalent with thin carbon films, has been evidenced by protective-coating discoloration in Unichrome coatings and resistance change with both the Unichrome and A. C. Horn types of protective coatings. In general, the resistors exhibited good stability during processing and testing procedures. G-1080-2. 26th interim report on Contract W33-038-ac-15173 (16525). Pages 608-619. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 27TH, PERIOD DEC 30, 1948 TO JAN 30, 1949, by A. E. Middleton, E. Paskell, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Jan 1949. 10p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106932

In resuming the efforts to produce a high-temperature-operating carbon film resistor, the status of previous progress has been reviewed, and the in-

herent weak points of the resistors, and in the resistor processing methods have been considered. A concentrated plan of attack, incorporating the requirements given in the new contract, has been formulated. G-1080-2. 1st report under Contract AF33(038)-468. Continuation of W33-038-ac-15173. Pages 620-626. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 33D, PERIOD JUNE 30, 1949 TO JULY 31, 1949, by A. E. Middleton, E. Paskell, K. E. Cochran, N. Crane, N. Haldy, B. Brand, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Jul 1949. 12p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106933

Production data is given for a new zircon porcelain, designated Z-9, which has a smoother surface and a denser structure than previous zircon porcelains. Results of work which has led to improvements in silver end contacts and spiralling techniques are presented. A modified humidity test is described, and preliminary results of using this test in analyzing protective coatings are given. G-1080-2. Seventh interim report under Contract AF 33 (038)-468. Pages 696-704. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

FIXED COMPOSITION RESISTORS. INTERIM ENGINEERING REPORT, 37TH, PERIOD OCT 31 TO NOV 30, 1949, by A. E. Middleton, E. Paskell, N. Haldy, B. Brand, and L. R. Jackson. Battelle Memorial Institute, Columbus, Ohio. Nov 1949. 25p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106934

This month, a specific design of carbon-film resistor has been accepted as a standard.' Work has simultaneously been done on improvement and evaluation of this base-line resistor. The studies aimed at improvement of this resistor have involved the following: 1. Miniaturization of zircon bases. 2. Evaluation of the temperature coefficient of resistance of carbon films on Z-10 and Z-9 bases as a function of production conditions. 3. Determinations of the rate of change of resistance of unprotected carbon films owing to oxidation at 225°C. 4. Development of more easily processed silver end contacts. These investigations have produced a batch of 0.060"-diameter zircon bases and a silver end contact which can be fired at 250°C. in air in 30 minutes. The suitability of both of these developments is not known as yet. In addition, it has been shown that certain unprotected carbon films show a 10% change in resistance after seven days at 225°C. Tentatively, it has also been found that the Z-9 base may be more suitable than the Z-10 base for high-temperature-operating stable resistors. Evaluations of the standard resistor (see Figure 145 for its description) have so far revealed that: 1. It will withstand over 300 hours in 95% humidity under a cycled 110-V.A.C. load without any observed change in resistance. This is, of course, true only for resistors with carefully applied protective coatings. Actually, out of 19 resistors tested, 8 illustrated the validity of this conclusion. 2. It will not change in resistance when held at 225°C. for more then 100 hours. 3. Its carbon film adheres more strongly to the ceramic base than does the protective coating. 4. Its end caps grip the resistor body satisfactorily at 200°C. However, copper-wire leads are not suitable and will have to be replaced by wire which will withstand such temperatures. G-1080-2. Eleventh interim report under Contract AF 33 (038)-468. Pages 744-765. Reports on this contract are PB 103436-103440, 106911-106934, and Final report is PB 102788.

LOGARITHMIC ATTENUATOR, by Sydney Rattner. U. S. Naval Research Laboratory. Apr 1952. 10p diagrs, graphs Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.25. PB 106745

The logarithmic attenuator is composed of a network of resistors and biased diodes capable of compressing slow or fast varying signals with a peak amplitude of 1,000 volts in such a manner that the output is proportional to the logarithm of the input. Tests described herein substantiate these characteristics for applied dc voltages and for sawtooth and exponential pulses of several hundred microseconds duration and of amplitudes covering three decades from 1,000 to 1 volt. NRL R 3907.

MAGNETIC FLOWMETER OUTPUT POTENTIALS, by E. R. Astley. General Electric Co. General Engineering Laboratory, Schenectady, N. Y. Mar 1952. 19p diagr Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106910

An analytical investigation of the Faraday effect produced by a fluid moving through a magnetic field is described and gives the potential distribution functions which express the potential at any point in the fluid or at any point in the pipe wall.

Lumber and Wood Products

REPORT OF THE FOREST PRODUCTS RESEARCH BOARD WITH THE REPORT OF THE DIRECTOR FOREST PRODUCTS RESEARCH FOR THE YEAR 1950. Gt. Brit. Dept. of Scientific and Industrial Research. Forest Products Research Board. 1951. 80p photos, graphs, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 106875

1. Forests and forestry - Research - Gt. Brit. 2. Wood - Research - Gt. Brit. 3. Wood - Chemical analysis - Gt. Brit. 4. Wood - Physical properties - Gt. Brit. 5. Wood - Preservation - Gt. Brit. 6. Wood - Seasoning - Gt. Brit.

S. O. Code no. 47-74-0-50.

SOME YIELDS OF WOOD RESEARCH AT V. P. I., by E. George Stern. Virginia Polytechnic Institute. Wood Research Laboratory, Blacksburg, Va. Apr 1952. 23p photos, drawings, diagrs, graphs Available from Virginia Polytechnic Institute, Wood Research Laboratory, Blacksburg, Virginia PB 106779

1. Wood - Research 2. Plywood - Research

3. VPI WRL 7.

Prepared for presentation at the meeting of the Southwest Virginia Engineers Club at Roanoke, Virginia on April 18, 1952. Virginia Polytechnic Institute. Wood Research Laboratory Publications, no. 7.

Machinery

DYNAMIC CAPACITY OF ROLLER BEARINGS, by G. Lundberg and A. Palmgren. 1952. 33p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106870

1. Roller bearings - Loads - Sweden 2. Roller bearings - Stresses - Sweden 3. Royal Swedish Academy of Engineering Sciences. Handlingar no. 210.

Acta polytechnica 96 (1951) Mechanical engineering series vol. 2, nr. 4. Also published as Ingeniörsvetenskapsakademiens Handlingar nr. 210.

EXPERIMENTAL INVESTIGATION OF THE PERFORMANCE OF A PILOT PLANT FOR DRYING AIR BY SOLID GRANULAR ADSORBENTS, by P. J. Bateman. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1951. 47p drawing, graphs, tables (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50. PB 106857

An investigation was undertaken to measure the performance on a pilot plant scale of uncooled beds of granular adsorbent when drying air to the low humidities required for supersonic wind tunnel operation. Two size grades of activated alumina and one of silica gel were tested in a bed 2 1/2 ft x 2 1/2 ft in plan, and of various depths between 12 and 25 inches. The bed was worked throughout at about atmospheric pressure and air was drawn from atmosphere without treatment for humidity or temperature. The results are presented, in the main, as graphs of mean bed concentration $\frac{\text{(mass of water adsorbed)}}{\text{(mass of activated adsorbent)}}$ against inlet humidity for two values of the outlet humidity, 0.0005 and 0.0002 lb water/lb air. It is shown that over the ranges of the variables encountered the mean bad concentration decreases with increasing inlet humidity, increases with increasing bed depth at a fixed contact time, and decreases with increasing grain size. Although a definitive comparison is not possible there does not appear to be much difference in the performance of silica gel and activated alumina of the same grain size. Cover date is 1952. S. O. Code no. 23-9006-79. Technical note no. Aero 2090. ARC CP 79.

Medical Research and Practice

ACCOMPAINMENTS OF WORD INTELLIGIBII ITY, by John W. Black. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla. Feb 1952. 18p tables .Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106872

This study was concerned with the relationships between word intelligibility and aspects of the syllabic pattern, word familiarity, phonetic characteristics of words and the relative intelligibility of words based on a sample of 3697 words of medium (20-80%) intelligibility. Ten thousand words were screened from Thorndike's la-10 categories to give the final experimental list. Eighty panels of listeners, 9-12 subjects per panel, listened to the words in classroom "quiet" (65 db of white noise), each panel heard some 450 words. Another 80 panels listened to the words in noise (110-118 db aircraft type) at approximately 2 db signal to noise ratio. The analyses indicate that the more familiar words are more accurately identified. Structural characteristics also contribute to recognition; words with many sounds are more intelligible than words with fewer sounds. Thus, three influences, two of them contrary, operate in the auditory recognition of a word. Word familiarity and word complexity operate against each other while phonetic elements add a third dimension that differs from each of the preceding factors, but may not necessarily operate against either of them. Eighteen sounds tend to enhance the recognition of words; seven to detract. An intelligible word would seem to be a familiar one, with more than one syllable, the accent on the second syllable and composed of combinations of the 18 more intelligible sounds. Either alternately to the criterion of familiarity, or imposed upon it, the word to be intelligible should contain more instead of less sounds. Joint project report no. 9, Ohio State University Research Foundation, Columbus, O. under Contract N6onr-22525, project NR142-992 and U. S. Naval School of Aviation Medicine, Bureau of Medicine and Surgery project NM001, 064.01.09. NAV MED Proj. NM001, 064.01.09.

BODY SURFACE AREA OF ESKIMOS AS DETERMINED BY THE LINEAR AND HEIGHT-WEIGHT FORMULAS, by Kaare Rodahl and James Edwards, Jr. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. May 1952. 26p photos, drawings, map, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106897

1. Anthropometry - Alaska 2. Body, Human - Weight - Alaska 3. Eskimos - Anthropometry 4. Linear systems - Computing methods - Alaska 5. AAF AAL Proj. 22-1301-0001, Part 1.

BRIGHT-ADAPTATION DEVICE FOR USE WITH DIFFERENT NIGHT-VISION TESTERS, by H. W. Rose. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1952. 9p photos, graph, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106892

A diffusing sphere providing regulated illumination was constructed. Tests employing pre-bright-adaptation by means of this sphere show the effects of pre-bright-adaptation to various levels of luminance on subsequent dark adaptation. The effects are significant and of practical value. AAF SAM Proj. 21-31-003, Report no. 1.

CONTINUOUS RECORDING OF TONIC AND ACTIVITY PRESSURES IN THE GASTROINTESTINAL

TRACT AT VARIOUS ALTITUDES. I. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Mar 1952. 17p diagr, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106799

By-inserting one end of an open-tipped catheter tube into the lower colon and attaching the other end to an electronic recording unit, one can record continuously the changes in tone and activity that occur at ground level and upon ascent to altitudes in the decompression chamber. It was observed that colonic tones does not vary appreciably on going to altitude, but the activity measurements showed a maximal average increase from 152 percent at ground level to 204 percent at 12,00 feet and 269 percent at 25,000 feet. With oxygen inhalation at 12,000 feet there was an average increase in activity of 249 percent. On the ingestion of 1 pint of water or milk, the activity at 25,000 feet showed readings of 320 percent and 346 percent, respectively. For part II see PB 106800. AAF SAM Proj. 21-23-025, Report no. 1.

DEVELOPMENT OF SURVIVAL EQUIPMENT PECULIAR TO AIR EVACUATION, by Frederick A. Rodewald, and Florence F. Fintak. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Mar 1952. 25p photos, map, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106828

To improve chances for survival in case of crash or ditching of air evacuation aircraft, the following are recommended: (1) Presence of medical personnel to administer aid to crew and patients. (2) Standing operating procedures for crash and ditching of various types of aircraft carrying different types of equipment. (3) Placing the patient in the plane so that he will be protected from additional injury in case of accident. (4) Selection of equipment, clothing, and food to meet the needs if forced down at any point on flights extending over wide ranges of latitude and various types of terrain. (5) Use of lighter equipment and new survival items. AAF SAM Proj. no. 21-40-004, Report no. 1.

DYNAMICS OF BLOOD FLOW UNDER ABNORMAL PRESSURE. II: EFFECT OF ACUTE HYPOXIA AND ANOXIA ON PULMONARY ARTERIAL PRESSURE OF NARCOTIZED DOGS, by Earl F. Beard, John D. Alexander, and Thomas W. Howell. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1952. 15p graphs, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106873

The effects of breathing mixtures containing 8.5 to 0 percent oxygen on the heart rate, respiratory rate, femoral arterial pressure, and pulmonary arterial pressure of the intact, closed-chested, narcotized dog were compared. Mixtures containing 8.5 percent oxygen failed to significantly elevate pulmonary arterial pressures under the experimental conditions used, but 5.8 percent oxygen did produce such increases in 3 animals. Breathing an oxygen-free atmosphere until apnea occurred produced alterations in pulmonary arterial pressure which were qualitatively different from those occurring in systemic arteries. AAF SAM Proj. no. 21-26-003, Report no. 2.

HIGH-ALTITUDE FLIGHT TEST OF LIQUID-OXYGEN AIR-CREW BREATHING SYSTEM, by John Paul Stapp. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1951. 27p photos, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106829

AB-17D aircraft was supplied with the Pioneer-Eclipse Bendix Liquid Oxygen Converter with a capacity of 65 pounds which was used in 18 flights of 4 to 6 hours duration at altitudes from 15,000 to 45,000 feet by 5,000-foot increments during which 5 to 8 subjects, using A-13 masks and pressure regulators, breathed the oxygen supplied by the converter. In all the flights there was no instance of failure of an adequate oxygen supply to all subjects for the maximum duration of the flight. The pilot and copilot were supplied with oxygen from a standard 450-pound pressure oxygen system. On two flights there were failures of the copilots oxygen supply due to leakage or other mechanical failures. The incidents of high altitude bends, airsickness, aerotitis, aerosinusitis were no higher than would be expected among selected subjects with a standard oxygen supply system. It has been demonstrated that the liquid oxygen converter is reliable and acceptable at all altitudes tested. In-flight feeding was proven feasible under the experimental conditions up to 35,000 feet of altitude. AAF TR 6004.

MANAGEMENT OF PSYCHIATRIC PATIENTS DURING TRANSPORTATION BY AIR. I: MECHANICAL RESTRAINING DEVICES AND SEDATION, by Benjamin A. Strickland, Jr., Charles Ferris, Maynard F. Tinkham, and Eleanor Welch. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1952. 24p photos, drawings, diagrs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106827

As a method of controlling disturbed psychiatric patents during evacuation by air, the use of restraints is more desirable than sedation. Ankle and wrist restraints will usually suffice. Leather cuffs should be made more adjustable as to size and the locking mechanism improved as to security and quick release. A special chest and shoulder harness could be developed for immobilizing the upper chest and shoulders of the more unmanageable patients. In giving sedatives, the oral method of administration is to be preferred. When injections are unavoidable, the subcutaneous injection of scopolamine is the procedure of choice. Paraldehyde and scopolamine are recommended above the barbiturates. AAF SAM Proj. no. 21-39-001, Report no. 1.

MANUAL ARTIFICIAL RESPIRATION IN RATS AND GUINEA PIGS, by Henry E. Swann, Jr., Peter V. Karpovich, David B. Dill. U. S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. Mar 1952. 21p drawing, table Available from Library of Congress, Photoduplication Section, Washing-

ton 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106824

1. Respiration, Artificial 2. CC MD RR 105. Project no. 4-08-01-002.

MECHANISMS OF ALTITUDE ADAPTATION. I: THYMUSADRENAL GLAND INTERRELATIONSHIP IN PARABIOTIC RATS UNDER HYPOXIA, by Bernard Hoelscher, and Kurt R. Reissmann. U. S. Air Force. School of Aviation Medicine. Randolph Field, Texas. Mar 1952. 22p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106825

A study was made of the interrelationship between the thymus and adrenal glands in parabiotic rats under hypoxia. One parabiont was thymectomized; the other, adrenalectomized. In the different experiments, hypoxia was imposed on one parabiout, while the other breathed normal air. The adrenal cortex in the thymectomized partner was larger under hypoxic conditions than when hypoxia was imposed on the adrenalectomized parabiont. The thymus in the adrenalectomized parabiont responded slightly only when that partner was hypoxic. In the thymectomized partners, enlarged liver and intestines were observed in all instances. The heart of the thymectomized parabiont was invariably increased in size, but to a lesser degree when the adrenalectomized parabiont was hypoxic. AAF SAM Proj. no. 21-23-003, Report no. 5.

PULMONARY EFFECTS FOLLOWING CHRONIC EXPOSURE TO HS VAPOR, by Ernest C. Brown, Jr. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. May 1949. 37p photos Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106820

A clinical study was made of personnel at Huntsville Arsenal, Alabama, that had been exposed during the 8-hr working day to long term, low, varied concentrations of HS vapor with no respirator protection. One or more episodes of acute eye and pulmonary signs and symptoms were experienced. After a short leave of absence from work following acute exposure, all symptoms except the pulmonary cleared up. However, the cough would continue and gradually become productive of foul muco-purulent sputum. The clinical syndrome is outlined. The outstanding features of this are cough, chest pain, shortness of breath, and fatigue. It is recommended to make in the future a careful survey of any plant handling HS and to do bronchograms in any patient suspected of respiratory disease following exposure to HS or HN. Medical Division Report no. 187. CMLEM-52. Project no.: 4-59-12-07. Experimental data: Date started: 4 May 1948. Date completed: 24 Jan 1949. CC MD R 187.

RADIATION AREA OF THE HUMAN BODY, by Armad Guibert and Craig L. Taylor. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1951. 37p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106831

A method for determining directly the area of that part of the body surface which takes part in radiation exchange with the surround is described, together with results obtained for three subjects of divergent body shape and for four different body postures. The analytical basis of the method is developed from the concept of the local shape factor integrated over all space, permitting, by use of the reciprocity theorem, an evaluation of the equivalent total projected area, defined as the radiation area. The experimental procedure involves the photographing of the human subject at a fixed distance in excess of 15 feet, from 32 viewing angles chosen to sample effectively the surface of a hemisphere described about the sagittal plane as equator. The planimetered areas from each photograph, representing projections of the body, are plotted as functions of two angles which define the viewing position, and by a graphical integration procedure the total area "seen" by the whole of the surround is obtained. AAF TR 6706.

SEMI-ANNUAL TECHNICAL PROGRESS REPORT 31 DEC 1951: AERO-MEDICAL SUBCOMMITTEE, USAF SCHOOL OF AVIATION MEDICINE & ARCTIC AEROMEDICAL LABORATORY SUPPLEMENT, VOL. II. U. S. AIR FORCE. TECHNICAL COMMITTEE, WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO. CASE NO. 5-3, REPORT NO. 5. Dec 1951. 407p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $9.00, Photostat $51.25. PB 106797

1. Medicine, Aviation - Research 2. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska 3. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas.

Report on projects of the Arctic Aeromedical Laboratory and on projects of the School of aviation medicine.

"SPEKK-FINGER", A CLINICAL CONDITION OBSERVED IN PERSONNEL HANDLING ARCTIC SEALS, by Kaare Rodahl. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. May 1952. 17p photo Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106898

1. Cellulitis - Therapy - Alaska 2. Fingers - Infection - Alaska 3. Seals (Animal) - Handling - Occupational infection - Alaska 4. AAF AAL Proj. 22-1401-0003.

STIMULATION OF TARSAL RECEPTORS OF THE BLOWFLY BY ALIPHATIC ALDEHYDES AND KETONES, by L. E. Chadwick and V. G. Dethier. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. Jun 1948. 15p graph, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106864

1. Phormia regina Meigen - Stimulation 2. Aldehydes, Aliphatic - Effect on insects 3. Ketones, Aliphatic - Effect on insects 4. CCD MD R148. Project no. 4-65-02-03.

TECHNICAL REPORTS News letter

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U. S. DEPARTMENT OF COMMERCE
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NO. 37, JULY 1952

Latest Developments in PRECISION METAL CASTING PROCESS

The "lost-wax" or investment casting process uses an expandable wax pattern surrounded by silica refractory molds for casting metals closely to finished dimensions. This antique process was revived and expanded in recent years to produce dental castings, jewelry, and expecially for jet engine parts that can not be readily forged or machined. It is also used to save tooling time and expense in making small intricate parts of mechanisms in common steels and non-ferrous metals.

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Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York, Price $6.75.

Guide To SMALL METALLURGICAL FURNACES

To get the right metal melting or heat treating furnace for the job at hand is often difficult because of the great variety of small metallurgical furnaces commercially available and the shortage of design information to be had on them. To meet the situation a Canadian National Research Council Report tells what information is needed to pick the right furnace for the job and where to find it. Order Small Metallurgical Furnaces - A Guide to the Literature on Design and Construction. (12A)

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PB 99807, THE NON-FERROUS METAL INDUSTRY IN GERMANY, 198 pages, tables, Price $.90.

PB 100974, TELECOMMUNICATIONS AND EQUIPMENT IN GERMANY, 56 pages, Price $.40.

PB 97432, POWDER METALLURGY IN GERMANY, 28 pages, Price $.20.

Valuable also are these guides on where to find information on German Technical Developments.

PB 101458, THE GERMAN CHEMICAL INDUSTRY, A BIBLIOGRAPHY OF THE CHEMICAL METALLURGICAL, AND PROCESS INDUSTRIES, 392 pages, Price $10.00.

PB 98192, THE JOINT INTELLIGENCE OBJECTIVES AGENCY SUBJECT INDEX OF SCIENTIFIC AND TECHNICAL REPORTS - VOL. I. 523 pages, Mimeograph $5.00.

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PRODUCTIVITY GUIDE - IN PACKAGED FOODS. The reports by a visiting British productivity team which studied the U. S. food packaging industry is a "productivity mirror" in which many a U. S. food manufacturer can see ways to make his plant more productive. The key factors responsible for our food packaging industry's high productivity are highlighted in this book-length report, particularly in these very good chapters: Supplies, Production Methods and Factory Buildings, Scientific Control and Research, Sales and Distribution, and Individual Products. Order PB 106436, 71 pages, Mimeo. Price $1.15.

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Metals and Metal Products

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. FIRST QUARTERLY PROGRESS REPORT, APR 1 TO JUN 30, 1949, UNDER CONTRACT NO. W36-039-SC-38239, by Ernst Albers-Schoenberg and Harold A. Goldsmith. General Ceramics and Steatite Corp., Keasbey, N. J. Jul 1949. 40p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106977

1. Ferrite, Ferromagnetic 2. Ferromagnetic materials 3. SIG Contract W36-039-sc-38239 Quarterly report no. 1.

Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. SECOND QUARTERLY PROGRESS REPORT, JULY 1 TO SEP 30, 1949, UNDER CONTRACT NO. W36-039-SC-38239, by Ernst Albers-Schoenberg and Harold A. Goldsmith. General Ceramics and Steatite Corp., Keasbey, N. J. Oct 1949. 34p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106978

1. Ferrite, Ferromagnetic 2. Ferromagnetic materials 3. SIG Contract W 36-039-sc-38239 Quarterly report no. 2.

Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. THIRD QUARTERLY PROGRESS REPORT, OCT 1 TO DEC 31, 1949, UNDER CONTRACT NO. W36-039-SC-38239, by Dr. E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramic and Steatite Corp., Keasbey, N. J. Jan 1950. 37p drawing, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106979

1. Ferrite, Ferromagnetic 2. Ferromagnetic materials 3. Kilns, Gas - Design 4. Ferrite, Ferromagnetic - Production - Patents 5. SIG Contract W36-039-sc-38239, Quarterly report no. 3.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. FOURTH QUARTERLY PROGRESS REPORT, JAN 1 TO MAR 31, 1950, UNDER CONTRACT NO. W36-039-sc-38239, by Dr. E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramics and Steatite Corp., Keasbey, N. J. Apr 1950. 30p drawing, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106980

1. Ferrite, Ferromagnetic 2. Ferromagnetic materials 3. SIG Contract W36-039-sc-38239, Quarterly report no. 4.

Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. SIXTH QUARTERLY PROGRESS REPORT, JUL 1 TO SEP 30, 1950, UNDER CONTRACT NO. W36-039-SC-38239, by Dr. E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramics and Steatite Corp., Keasbey, N. J. Oct 1950. 34p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106981

Problems involved in the development of high Q bodies are discussed. Emphasis is placed upon kiln atmosphere and graphs of these higher Q bodies are shown. Experiments have been made with the aim of reducing cracks in extruded ferrite bodies. The results show that speed of firing, type and quantity of binder and vapor exhaustion are of prime importance. Several new compositions are discussed with emphasis placed on their magnetic and physical properties. Firing conditions are also reported. Graphs and tables are included. An explanation of the large hysteresis loss coefficient "a" for the new low loss bodies is attempted. Values of the "a" coefficient have been included in the tables. A complete set of hysteresis curves, normal magnetization curves and permeability vs. flux density for all the bodies are included. Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. SEVENTH QUARTERLY PROGRESS REPORT, OCT 1 TO DEC 31, 1950, UNDER CONTRACT NO. W36-039-SC-38239, by Dr. E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramic and Steatite Corp., Keasbey, N. J. Dec 1950. 36p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106982

The development of high saturation bodies is being carried out. Graphs are included which show among other things, saturation values of 4600 to 5000 gausses. An empirical relationship between initial permeability maximum permeability and the temperature coefficient of initial permeability has been found. A table is included which shows the relationship for various ferrite bodies. Particular emphasis is placed upon deviations from this relationship. Cup core measurements have been made at low frequencies A complete coverage of Q and inductance has been attempted and the results are shown in tabular form for "E" 212 material. One graph of maximum Q values attained also is included. Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. EIGHTH QUARTERLY PROGRESS REPORT, JAN 1 TO MAR 31, 1951, UNDER CONTRACT NO. W36-039-SC-38239, by Dr. E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramic and Steatite Corp., Keasbey, N. J. Mar 1951. 39p graphs, tables Available from Library of Con-

gress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106983

The results of a study on bodies of the MnO-ZnO-Fe_2O_3-system is reported. Starting from a composition according to an analysis of natural Franklinite several variations of this body have been made and investigated. Some of them show quite remarkable properties as for instance, a very low coercive force and high saturation flux density. In one of these bodies an initial permeability of just slightly below 2000 has been obtained. Lithium carbonate has been introduced into some mixed ferrite bodies of bivalent metal oxides. As far as can be judged from a few experiments Lithium ferrite itself does not exhibit out-standing properties, but is quite useful as an additional ingredient. A body of the system NiO-ZnO-Fe_2O_3, (FM-281) has given satisfactory results as for u_o and Q for cup cores, used between .1 and 1 mega-cycles. In this report the hysteresis and u vs. flux density curve is added to the previous measurements. Cup core measurements have been extended on the bodies MF-472 and MF-419. A recently acquired planimeter has been exploited for evaluation of hysteresis curves. Dept. of Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

EFFECT OF OXYGEN CUTTING ON WELDABILITY OF ARMOR PLATE (OD-136) PROGRESS REPORT, OCT 1, 1943 TO APR 15, 1944, by F. C. Saacke, F. N. Stone, C. J. Sullivan, and J. J. Crowe. Air Reduction Co., Inc. Jun 1944. 84p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $3.75, Photo stat $11.25. PB 106764

1. Armor plate - Cutting 2. Armor plate - Weldability 3. National Research Council. War Metallurgy Committee 4. OSRD 3915 5. WMC M-285.

NDRC research project NRC-71, OEMsr1187.

FATIGUE STRENGTHS OF 14S-T4 ALUMINUM ALLOY SUBJECTED TO BIAXIAL TENSILE STRESSES, by Joseph Marin and W. P. Hughes. U. S. National Advisory Committee for Aeronautics. Jun 1952. 24p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106947

The purpose of this investigation was to determine the influence of biaxial tensile stresses on the fatigue strength of a 14S-T4 aluminum alloy when subjected to various ratios of biaxial stresses. The effect upon the fatigue strength of varying the ratios of biaxial stresses was studied. The biaxial fatigue stresses were produced by applying simultaneously a pulsating internal pressure and a fluctuating axial tensile load to a thin-walled tubular specimen. The maximum and minimum values of the longitudinal and circumferential stresses were kept in phase by adjusting the testing machine. The fatigue strengths and S-N diagrams were obtained up to about 10^7 cycles for four principal stress ratios. NACA TN 2704.

FUNDAMENTAL STUDY OF THE MECHANISM BY WHICH HYDROGEN ENTERS METALS DURING CHEMICAL AND ELECTRO-CHEMICAL PROCESSING, by L. D. McGraw, C. A. Snavely, H. L. Moore, P. T. Woodberry and C. L. Faust. U. S. National Advisory Committee for Aeronautics. Apr 1952. 44p photos, diagr, table Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106804

Through the correlation of several known methods of controlling entry and exit of hydrogen in steel with the known chemical behavior of atomic and molecular hydrogen suitable reagents were found which increase or, for the first time, significantly decrease hydrogen permeability and embrittlement of steels during cathodic pickling and plating operations. This succesful correlation was an important step toward arriving at the mechanism of hydrogen entry into steel. It is proposed that entry is through the direct formation of metal hydrides (intermetallic compounds) or solid solutions of hydrogen in metal at the instant of hydrogen discharge and that exit is the decomposition of metal hydrides or of solid solutions of hydrogen in metal. NACA TN 2696.

INVESTMENT PRECISION CASTING, by Roy W. Tindula. U. S. Office of Technical Services. May 1952. 15p Available from Office of Technical Services, U. S. Department of Commerce, Washington 25. D. C. Mimeo: $.25. PB 111001

1. Lost-wax process 2. Cobalt alloys - Casting 3. Castings, Precision 4. TAS 101.

LARGE FORGINGS IN GERMANY. LECTURE DELIVERED AT LIGHT METALS FORGING SYMPOSIUM, WYMAN-GORDON COMPANY, WORCESTER, MASSACHUSETTS, 3 AND 4 MAY 1948, by Hubert Altwicker. n.d. 21p photos, diagrs, graph, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106984

1. Light metals - Forging - Germany 2. Steel forgings - Physical properties - Germany 3. Forgings - Fabrication - Germany 4. Aluminum-copper alloys - Forging - Germany 5. Aluminum-copper-magnesium alloys - Forging - Germany 6. Aluminum-magnesium-zinc alloys - Forging - Germany 7. Magnesium alloys - Forging - Germany 8. Light Metals Forging Symposium, Wyman-Gordon Company, Worcester, Mass. 3 and 4 May, 1948. 9. Wyman-Gordon Company, Worcester, Mass. 10. U. S. Air Materiel Command. Industrial Planning Division, Wright-Patterson Air Force Base, Dayton, Ohio.

Prepared in English by Dr. Hubert Altwicker. Prepared by Industrial Planning, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Author was formerly Director of Light Metals Division of I. G. Farben Industrie, Bitterfeld, Germany.

LIGHT METAL CASTING, MISCELLANEOUS PAPERS Germany. Reichsluftfahrtministerium. 1938-1939. 521f (Text in German) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $9.00, Enlargement Print $70.00. PB 106835

1. Light metals - Casting - Germany 2. Micro BIOS FD 5687/45, Frames 1-493, English abstract included.

MAGNESIUM COATING AND CORROSION (INCLUDING CATHODIC PROTECTION) A LITERATURE

SURVEY PREPARED by Francis D. Horigan. U.S. Office of the Quartermaster General. Military Planning Division. Research and Development Laboratories. Technical Library. Jan 1952. 39p Available from Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C. Mimeo: $1.00. PB 106654

This literature survey has been prepared to furnish Quartermaster technicians with existing methods for evaluating the performance of magnesium coatings on base metals and to present information dealing with corrosive influences on these coatings in order that new products may be developed to meet new, more stringent acceptance tests. The scope of the present survey is limited to the years 1946-'51. It is comprehensive, covering all the essential articles relevant to the field. The subject matter of the bibliography is so homogeneous that it obviates any necessity for a topic index. Since the arrangement is alphabetical by author, a name index is not indicated. Full titles to publications are given to circumvent confusion and added research. QMC TI BS21.

NEUZEITLICHES GIESSEN VON LEICHTMETALLBLÖCKEN (MODERN METHODS OF CASTING LIGHT METAL INGOTS), by P. Brenner and W. Roth. Nov 1942. 8f photos, diagrs, graphs (Text in German) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Enlargement Print $2.50. PB 106834

1. Light metals - Casting - Germany 2. Vereinigte Leichtmetall-Werke G.m.b.H., Forschungsinstitut, Hanover, Ger. 3. Micro BIOS FD 1468/46, Frames 1-5.

English abstract included. Abstract available as PB 106834s. 1p. Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. Reprinted from Metallwirtschaft vol. 21, no. 45/46, 13 Nov 1942.

SOME EXPERIMENTS ON THE RESISTANCE OF METALS TO FATIGUE UNDER COMBINED STRESSES, by H. G. Gough, H. V. Pollard and W. J. Clenshaw. Gt. Brit. Ministry of Supply. Aeronautical Research Council. 1951. 155p photos, drawings, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $10.00. PB 106839

The basic object of the investigation was an experimental study of the fatigue resistance of metals to combined flexural and torsional stresses to which many engineering components, particularly crankshafts, are subjected in practice. Four independent variables have been employed; reversed bending stresses, reversed torsional stresses, static bending stresses and static torsional stresses superimposed on these cyclic stresses. Supplementary static, impact and simple fatigue tests, with chemical analysis and metallurgical examination, have been made on all the test materials. The investigation falls naturally into two parts, in which form it is reported. Part I of the report describes a comprehensive research into the fatigue behaviour of a selection of engineering steels and two alloy cast irons under combined bending and torsional stresses alternating in phase, the mean stress of both types of stress cycle being zero in every case. Part II of the report describes a research into the resistance of a Ni. Cr. Mo. Va. aircraft steel to combined fatigue stresses in which the four independent variables have been investigated. S. O. code no. 23-2522. Includes 11 earlier ARC reports. ARC RM 2522.

TITANIUM-COLUMBIUM, TITANIUM-MOLYBDENUM, AND TITANIUM-SILICON PHASE DIAGRAMS, by M. Hansen, H. D. Kessler, E. L. Karmen, D. J. McPherson. Armour Research Foundation, Chicago, Ill. Jun 1951. 128p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 106954

The titanium-columbium, titanium-molybdenum, and titanium-silicon systems were determined using alloys cast in consumable and nonconsumable electrode inert atmosphere arc melting furnaces. Both DuPont Process A and iodide titanium were used in the preparation of alloys. Working and annealing treatments were carried out under conditions that minimized contamination of the high purity alloys. Micrographic analysis after isothermal annealing followed by quenching was the chief method used for phase identification. X-ray diffraction was used to determine lattice constants and identify certain phases, and both thermal analysis and microscopic detection of incipient melting were used to locate melting temperatures, including those of the pure metals, titanium, columbium, and silicon. Vickers hardness data determined on the various alloys after annealing treatments and theoretical calculations of the beta/alpha-plus-beta boundaries of the titanium-columbium and titanium-molybdenum systems are presented in the Appendix. Contract AF 33(038)-8708. AAF TR 6225.

ÜBER DAS ZUNDERN VON METALLE UND LEGIERUNGEN (OXIDATION OF METALS AND ALLOYS), by Erich Scheil. Jun 1952. 16p photos, diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106976

This paper reviews the various types of oxidation processes occurring with pure metals and gives explanations for the varying time-temperature-oxidation rate relations that exist for copper, tungsten, zinc, cadmium, and tantalum. The effect of shape and crystal structure on oxidation is discussed. Principles derived are applied to the oxidation of alloys. Translated from Zeitschrift für Metallkunde. Vol. 29, July 1937, pp. 209-214. NACA TM 1338.

Meteorology and Climatology

PROJECT CIRRUS. OCCASIONAL REPORT NO. 31: SPRAY NOZZLE TYPE OF SILVER IODIDE SMOKE GENERATOR FOR AIRPLANE USE, by Bernard Vonnegut and Kiah Maynard. General Electric Co. Research Laboratory, Schenectady, N. Y. Feb 1952. 25p photos, diagrs, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106887

1. Generators, Smoke 2. Clouds - Seeding 3. SIG Contract DA-36-039-sc-15345, 2d occasional report 4. GE RL 635.

Paper presented before American Meteorological Society, Minneapolis, Minn. Oct. 9-11, 1951. Dept. of the Army project: 3-90-07-022. Signal Corps project: 24-127B-O.

PROJECT CIRRUS. OCCASIONAL REPORT NO. 32: CONTINUOUS CLOUD CHAMBER FOR STUDYING SMALL PARTICLES IN THE ATMOSPHERE, by Vincent J. Schaefer. General Electric Co. Research Laboratory, Schenectady, N. Y. Mar 1952. 13p diagrs Available from I ibrary of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106888

1. Cloud chambers - Design 2. Silver iodide - Production 3. SIG Contract DA-36-039-sc-15345, 3d occasional report 4. GE RI 654.

Third occasional report under Contract no. DA-36-039-sc-15345. Dept. of the Army project: 3-90-07-022. Signal Corps project: 24-172-B-O.

PROJECT CIRRUS. OCCASIONAL REPORT NO. 33: FORMATION OF ICE CRYSTALS IN ORDINARY AND NUCLEI-FREE AIR, by Vincent J. Schaefer. General Electric Co. Research Laboratory, Schenectady, N. Y. Mar 1952. 18p photos, diagr, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106889

1. Ice crystals - Formation 2. Cloud chambers 3. SIG Contract DA 36-039-sc-15345, 4th occasional report 4. GE RL 655.

Fourth occasional report under Contract no. DA-36-039-sc-15345. Dept. of the Army project: 3-90-07-022. Signal Corps project: 24-172-B-O.

UPPER ATMOSPHERE RESEARCH REPORT V, COMPILED AND EDITED by H. E. Newell, Jr. and J. W. Siry. U. S. Naval Research Laboratory. Jun 1948. 101p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $4.50, Photostat $13.75. PB 107001

Upper atmosphere research at NRI during the last three quarters of 1947 and first quarter 1948 is described. Study of solar spectra obtained is reported with description of experimental techniques and apparatus employed. Results of cosmic ray research, pressure and temperature studies, and mathematical analysis of geometry of cosmic ray Geiger counter telescopes are given. NRL R 3358.

Minerals and Mineral Products

GLASS TO TRANSMIT INFRARED RADIATIONS. INTERIM REPORT FOR THE PERIOD MAR 1 THROUGH APR 30, 1950 UNDER CONTRACT W44-009-ENG-469, by H. H. Blau. Ohio State University Research Foundation, Columbus, Ohio. May 1950. 39p graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106989

Development work on glass to transmit infrared radiations was continued with investigations of the technique of melting experimental glasses in controlled atmospheres. Studies of the time relationship involved in removing harmful absorption bands were made. The results indicate that a careful correlation between time, temperature, and size of melt should make possible adequate predictions of equilibrium conditions or retentions. Studies of the effect of various gaseous constituents on furnace atmosphere revealed that the entire absorption region from 2.5 to 4.4 microns noted in the transmission curves of the experimental glasses is caused by water vapor or hydroxyl groups. The addition of small amounts of antimony to the melt had no apparent effect, except that transmission in the visible and near infrared of shorter wavelengths was reduced by greater than 4% Sb_2O_3 in high-lead glasses. Project 314, Report no. 13.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. PROGRESS REPORT AT THE END OF THE CONTRACT YEAR, DEC 1, 1946, UNDER CONTRACT NO. W36-039-SC-32006, by John W. Gruner. Dec 1946. 27p tables Available from I ibrary of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106964

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. SIG Contract W-36-039-sc-32006.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. SIXTH QUARTERLY PROGRESS REPORT, MAR 1 TO MAY 31, 1947, UNDER CONTRACT NO. W-36-039-SC-32006, by John W. Grunner. May 1947. 20o drawing, graph Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106965

1. Crystals, Berlinite - Growth 2. Crystals, Aluminum phosphate - Twinning 3. Crystals, Piezoelectric - Growth 4. SIG Contract W36-039-sc-32006 Quarterly report no. 6.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC INVESTIGATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. SEVENTH QUARTERLY PROGRESS REPORT, JUN 1 TO AUG 31, 1947, UNDER CONTRACT NO. W-36-039-sc-32006, by John W. Gruner. Aug 1947. 13p diagr, graph, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106966

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 4. SIG Contract W36-039-sc-32006 Quarterly report no. 7.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. EIGHTH QUARTERLY PROGRESS REPORT, SEP 1 TO NOV 30, 1947, UNDER CONTRACT NO. W36-039-SC-32006, by John W. Gruner. Nov 1947. 34p graphs (1 fold) tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106967

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 4. SIG Contract W36-039-sc-32006 Quarterly report no. 8.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. NINTH QUARTERLY PROGRESS REPORT, DEC 1, 1947 TO FEB 29, 1948, UNDER CONTRACT NO. W-36-039-SC-32006, by John W. Gruner. Mar 1948. 22p fold. graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106968

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 4. SIG Contract W 36-039-SC-32006 Quarterly report no. 9.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. TENTH QUARTERLY PROGRESS REPORT, MAR 1 TO MAY 31, 1948, UNDER CONTRACT NO. W-36-039-SC-32006, by John W. Gruner. May 1948. 10p graph Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106969

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 4. SIG Contract W-36-039-sc-32006, Quarterly report no. 10.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. ELEVENTH QUARTERLY PROGRESS REPORT, JUN 1 TO AUG 31, 1948, UNDER CONTRACT NO. W-36-039-SC-32006, by John W. Gruner. Aug 1948. 14p photo, fold, drawing Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106970

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 5. SIG Contract W-36-039-sc-32006, Quarterly report no. 11.

PROBLEM OF GROWING LARGE CRYSTALS OF $AlPO_4$ (BERLINITE) SUITABLE FOR PIEZOELECTRIC APPLICATIONS, INCLUDING AN INVESTIGATION OF CAUSES AND ELIMINATION OF TWINNING IN ALUMINUM PHOSPHATE CRYSTALS. MINNESOTA. UNIVERSITY. DEPT. OF MINERALOGY AND GEOLOGY. TWELFTH QUARTERLY PROGRESS REPORT, SEP 1 TO NOV 30, 1948, UNDER CONTRACT NO. W-36-039-SC-32006, by John W. Gruner. Dec 1948. 10p drawing Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106971

1. Crystals, Berlinite - Growth 2. Crystals, Piezoelectric - Growth 3. Crystals, Aluminum phosphate - Twinning 4. Pressure, High - Equipment 5. SIG Contract W-36-039-sc-32006, Quarterly report no. 12.

Dept. of the Army project: 3-99-11-022. Signal Corps project: 142B.

UTILIZATION OF FLY ASH FOR "CELONIT" BUILDING MATERIAL. Deutsche Hydro Beton G.m.b.H., Alt-Garge, Ger. Oct 1951. 7f tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Enlargement Print $2.50. PB 106833

1. Ashes - Uses - Germany 2. Building materials - Germany 3. Celonit (Trade name) 4. Micro BIOS FD 502/51, Frames 1-4.

Abstract included. Letter from Office of Economic Advisor, Control Commission for Germany, British Element, signed by J. S. Train.

Personnel Aptitude Testing

EFFECTS OF A MILITARY PROGRAM UPON PHYSICAL PERFORMANCE, by J. Gordon Wells, and Thaddeus J. Domanski. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1952. 10p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D.C. Microfilm $1.25, Photostat $1.25. PB 106893

The Aviation Cadet Program at Randolph Air Force Base was associated with a significant improvement in physical performance capacity as judged by performance on a treadmill. The improvement occurred during the first month of the program. At the end of the program the physical performance capacity was essentially the same as it had been at the conclusion of the first month of cadet training. The improvement in physical performance capacity was achieved without benefit of either regular or strenuous physical training activities. AAF SAM Proj. 21-32-029, Report no. 1.

SOME PHYSIOLOGICAL ACCOMPANIMENTS OF SPEAKING, by John W. Black. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla. 35p graphs, tables Available from Library of Congress, Photoduplication Section Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 106938

The present studies were undertaken in an effort to get reliable data relative to the following problems: first, the relationship between amount of exhaled air and intensity of voice; and second, the effect of loud sustained speech upon the acid-base balance of the body. An extension of the latter problem prompted investigations of the relationships between the quantity of exhaled air and some phonetic elements. The four parts of this report describe the experimentation that led to the following results: 1. Loud speaking involves hyperventilation. 2. As a first approximation, the relationship between the volume of exhaled gas per unit of time and the sound pressure level (db) of a vowel-sound is apparently linear. 3. Integrated values of the respiratory volume and the acoustic pressure that accompany the production of consonants and vowels show that: (a) the final consonant includes more acoustic pressure (and is longer) than the initial consonant; (b) saying vowels and consonants requires about the same amount of exhalation, while the vowels may contain several times as much acoustic pressure as the consonants; and (c) there are wide individual differences in the amount of gas exhaled by different speakers maintaining the same acoustic level of loud speech. Joint project report no. 10, the Ohio State University Research Foundation, Columbus, Ohio, under Contract N6ONR 22525, Office of Naval Research Project designation no. NR 142-992, and U. S. Naval School of Aviation Medicine, the Bureau of Medicine and Surgery Project NM 001 064.01.10. Contents: Part I: Influence of loud speaking upon pulmonary gas exchange, by F. G. Hall, John W. Black, Keith K. Neely and Kenneth Hall. - Part II. Intensity of vowels in relation to pulmonary flow, by John W. Black. - Part III. Relationship between exhalation and vocal intensity in continuous speech, by John W. Black and F. G. Hall. - Part IV: Some breath-acoustic accompaniments of speech sounds, by John W. Black and F. G. Hall. NMRI Proj. NM 001 064.01.10.

Photographic and Optical Goods

VARIATION OF FILM OPTICAL DENSITY WITH TIME, by R. Herzel. U. S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. May 1952. 16p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 106953

1. Films (Photography) - Optical properties 2. Films (Photography) - Preservation 3. CC MD RR 110. Project no. 4-12-90-001.

Physics

General

APPLICATION OF CALCULUS OF MATRICES TO METHOD OF LEAST SQUARES WITH SPECIAL REFERENCE TO GEODETIC CALCULATIONS, by Arne Bjerhammar. 1951. 89p diagrs, graphs, tables (part fold) Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 106867

Procedures previously devised for dealing with problems by means of the method of least squares seem to be characterised by the fact that these procedures involve, in each individual case, and investigation made with the help of the differential calculus for the determination of a minimum. In the present paper, this problem is treated on the basis of a different principle. The main characteristics of this principle are briefly stated in what follows. The functional relations which hold good for the problem in question are deduced in a rectangular matrix equation. The unknown quantities are directly expressed in an general exolicit form by solving the above-mentioned rectangular matrix equation. This operation is carried out through multiplication by rectangular reciprocal matrices which are defined for this purpose, at the same time as rules are deduced for the calculations involving these matrices. Finally, from the general solutions one has to choose that unique solution, which satisfies the necessary conditions. It is shown that it is not required to take into account the weights of the different observations when deducing a solution, because there is a very simple law of attraction of the weight matrices for any given formula. A special study is made of the various forms of adjustment which are obtained by partitioning the rectangular matrix equation into submatrices. A study is also made of numerical methods for solving the rectangular matrix equation. A new method of solving normal equations is deduced. Acta polytechnica 91(1951) Physics and applied mathematics series vol. 1, nr. 10. Also published as Kungliga Tekniska Högskolans Handlingar nr. 49.

DISCRIMINATORY ANALYSIS, X: ON TWO CORRELATED BIVARIATE NON-NORMAL DISTRIBUTIONS, by Harry M. Hughes. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1952. 22p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106896

Distributions useful in discriminatory analysis when the assumptions of normality are not satisfied are derived and discussed in detail. The distributions are particularly suitable for study of accidents and accident proneness, since they provide for different parameters for different types of accidents, and the parameters in turn may have any distribution of a very flexible system of distributions. For reports 1-9 see PB 102690-PB 102692, PB 103907-PB 103903, PB 105465, PB 105624, PB 106894-PB 106895. AAF SAM Proj. 21-49-004, Report no. 10.

PITCHING MOMENT ACTING ON A BODY OF REVOLUTION MOVING UNDER A FREE SURFACE, by Hartley L. Pond. U. S. David W. Taylor Model Basin, Washington, D. C. May 1952. 21p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106862

The expression is given for the pitching moment acting on an elongated body of revolution moving under the free surface of a fluid of infinite depth. It is shown that the moment depends on the doublet distribution used to define the body in an infinite fluid, and on a second doublet distribution introduced to account for the effect of the waves formed on the free surface of the fluid. DWTMB 819.

Rubber and Rubber Products

CURE STUDIES OF SOME AROMATIC ALDEHYDE-AMINES IN GR-S, by W. B. Shetterly and U. E. Hanninen. U. S. Naval Research Laboratory. Apr 1952. 11p tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.50. PB 111002

To determine the vulcanizing characteristics of certain aldehydeamines as accelerators, investigations have been undertaken which show the effects of minor structural variations of such accelerators on the physical properties imparted to GR-S (butadiene styrene) standard vulcanizates. Aromatic aldehydes having several different structural configurations were reacted with a group of amines to produce variety in the amine component of the accelerator as well as in the aldehyde component. Twenty-four such aldehydeamines have been prepared for study in a selected rubber compound; twenty-one of these are new compounds. Evaluation of the aldehydeamines was made on the basis of tensile strength, elongation, hardness, oven aging, oxygen-bomb aging, and quantity of accelerators required to produce optimum cures. These tests show that some of the aldehydeamines prepared serve as effectively for accelerators in GR-S as heptaldehydeaniline or mercaptobenzothiazole. N RL R 3987.

Structural Engineering

ENERGY THEORY OF TRANSVERSE IMPACT ON BEAMS, INCLUDING THE EFFECTS OF SHEAR, ROTATORY INERTIA AND LATERAL CONTRACTION, by Bruno A. Boley, Robert E. Heninger and Vincent P. Zimnoch. Ohio State University. Dept. of Aeronautical Engineering, Columbus, Ohio. Jan 1952. 93p diagrs, graphs, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $4.25, Photostat $12.50. PB 106878

After a review of the literature, a theory for beams under transverse impact is derived. In this theory, expressions are assumed, in terms of some arbitrary parameters, describing the distance traveled along the bar by the disturbance, the displacement of the bar, and a portion of the displacement which is assumed to be caused by bending alone. The arbitrary parameters are then determined with the aid of the principle of virtual displacements. The effects of shear deformations, rotatory inertia and lateral contraction are included, and their importance is discussed. General considerations concerning the velocity of propagation of a disturbance are presented, as well as a simple approximate formula for this velocity. Four specific applications of the theory are worked out in detail; the shear force and bending moment distributions, the deflected shape and the variation of the velocity of propagation are calculated. The error in the results given by the approximate formula is, in the worst case, 15 percent of the more accurate calculated value. Contract N6-onr-225-29, Project NR064-355.

INFLUENCE OF FRAMES ON INSULATION OF COLD STORAGE CHAMBERS ON BOARD SHIP, by Bo Pierre. 1951. 66p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 106868

The present paper deals with the influence of frames on the heat transfer through the wall of a cold storage chamber on board shio. This wall, which is provided with frames, is replaced by a water bath, and the frame models are put into the bath. They are in good electric contact with one of the copper bars bounding the water bath on two opposite sides. The water bath containing the frame models represents the wall of the cold storage chamber including the film resistances on the internal and external surfaces of the wall, while the copper bars represent the air in the cold storage chamber and the fluid at the ship's side respectively. The current flowing through the water bath is measured in the absence and in the presence of the frame model, so as to determine the ratio of the thermal resistances of the insulation in the absence and in the presence of the frame. Acta polytechnica 92 (1951) Mechanical engineering series vol. 2, nr. 3. Also published as Kungliga Tekniska Högskolans Handlingar nr. 50.

INVESTIGATION OF A METHOD OF DETERMINING THE THERMAL INSULATION OF A SURVIVAL SHELTER, by Norman Bright and J. Donald Bowen. U. S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1951. 42p photos, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106909

1. Shelters - Insulation 2. Survival equipment 3. Shelters, Arctic - Tests 4. Heaters, Tent 5. AAF TSEAA MR 670-21V.

SANDWICH CONSTRUCTION AND CORE MATERIALS, PART V, SECTION I: SOME PHYSICAL PROPERTIES OF AN EXTRUDED CELLULAR CELLULOSE ACETATE. SECTION II: DETERMINATION OF POISSON'S RATIO IN COMPRESSION OF CERTAIN LOW DENSITY MATERIALS, by W. J. Pullen. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1947. 16p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 106845

Tensile, Compressive and Creep tests have been carried out on four different samples of Extruded Cellular Cellulose Acetate. It is concluded that the material is comparable with calcium alginate and other low-density materials so far handled in the Engineering Division, N.P.L. In particular, the samples are not subject to the same degree of 'softening' as has been the case with some similar materials. The 'filled' samples are more efficient than the 'unfilled' ones and are worth considering as possible low-density stabilizers in sandwich construction. Cover date is 1952. S.O. Code no. 23-2686. ARC RM 2686.

SHORT BORED PILE FOUNDATION. Gt. Brit. Dept. of Scientific and Industrial Research. Building Re-

search Station, Watford, Eng. May 1952. 8p photos, drawings, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.10. PB 106963

1. Houses - Foundations - Gt. Brit. 2. Piles - Foundations - Gt. Brit. 3. DSIR BRD 42.

Contents: Part I. Making the short bored pile foundation. - Part II. Application and design. S. O. code no. 72-22-0-42.

VOUSSOIR (SEGMENTAL) AND CONCRETE ARCHES, by A. Kooharian. Brown University. Graduate Division of Applied Mathematics. May 1952. 24p diagrs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106985

1. Arches, Voussoir 2. Structural analysis 3. Stability, Structural - Limit analysis 4. GDAM A11-72/22 5. GDAM TR 72.

Contract N7 onr-35801, T. O. I, NR-041-032. Paper presented at New England regional conference of student chapters ASCE, Apr 26, 1952.

Textiles and Textile Products

FUNGAL RESISTANCE OF COTTON THREAD, by James V. Harvey and Harold D. Lyster. U. S. Office of the Quartermaster General. Military Planning Division. Research and Development Laboratories. Chemicals and Plastics Section, Philadelphia Quartermaster Depot., Philadelphia, Pa. Oct 1950. 8p tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106881

1. Thread, Cotton - Tensile strength 2. Thread, Cotton - Fungus proofing 3. Fungus proofing 4. Fungicides - Tests 5. QMC RSTR C&P-178-F.

See also PB 106882-PB 106883.

FUNGAL RESISTANCE OF THREADS SOAKED IN OIL CONTAINING COPPER-8-QUINOLINOLATE, by James V. Harvey and Harold D. Lyster. U. S. Office of the Quartermaster General. Military Planning Division. Research and Development Laboratories. Chemicals and Plastics Section, Philadelphia Quartermaster Depot, Philadelphia, Pa. Nov 1950. 5p table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106883

1. Thread, Cotton - Tensile strength 2. Thread, Cotton - Fungus proofing 3. Fungus proofing 4. Copper-8-quinolinolate 5. Fungicides - Tests 6. QMC RSTR C&P-180-F.

See also PB 106881-PB 106882.

RELATIONSHIP BETWEEN THE STRUCTURAL GEOMETRY OF TEXTILE FABRICS AND THEIR PHYSICAL PROPERTIES. PART II. ABRASION RESISTANCE, by Stanley Backer. U. S. Office of the Quartermaster General. Military Planning Division. Research and Development Branch. Sep 1949. 96p photos, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $4.25, Photostat $12.50. PB 102228

1. Textiles - Physical properties 2. Textiles - Abrasion resistance 3. QMC TSR 61.

For Part 1 see PB 95956.

STABILITY TO WATER LEACHING OF VARIOUS ROTPROOFERS ON UNLINED LINEN FORESTRY HOSE, by G.R.F. Rose and C. H. Bayley. National Research Council of Canada. 1952. 10p tables (1 fold) Available from National Research Council of Canada, Ottawa, Canada $.25. PB 106986

1. Hose, Fire - Moisture proofing - Canada 2. Hose, Linen covered - Moisture proofing - Canada. NRCC 2 T30.

Transportation Equipment

Aeronautics

Aircraft

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART I: VELOCITY DISTRIBUTIONS FOR SYMMETRICAL AEROFOILS, by S. Goldstein. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1942. 62p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.50. PB 106849

This paper constitutes Part I of an approximate theory of two-dimensional aerofoils. Parts I and II deal with the "direct" problem of the calculation of the velocity distribution over the surface of a given aerofoil, Part I for symmetrical sections and Part II for cambered sections. Parts III and IV are concerned with the "inverse" problem of designing an aerofoil with a specified velocity distribution, Part II for symmetrical sections and Part IV for the camber-line. Part V discusses the chordwise position of the peak velocity, and also the theoretical C_L -range of low-drag aerofoils. Aerofoils with hinged flaps form the subject of Part VI. S. O. code no. 23-9006-68. Cover date is 1952. ARC CP 68.

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART II: VELOCITY DISTRIBUTIONS FOR CAMBERED AEROFOILS, by S. Goldstein. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Sep 1942. 63p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.50. PB 106850

1. Airfoils, Two dimensional - Theory - Gt. Brit. 2. Airfoils, Two dimensional - Velocity distribution - Gt. Brit. 3. ARC CP 69.

Cover date is 1952. S. O. code no. 23-9006-69.

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART III: APPROXIMATE DESIGNS OF SYMMETRICAL AEROFOILS FOR SPECIFIED PRESSURE DISTRIBUTIONS, by S. Goldstein and E. J. Richards. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 194-. 42p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.90 PB 106851

1. Airfoils, Two-dimensional - Theory - Gt. Brit. 2. Airfoils, Two-dimensional - Design - Gt. Brit. 3. ARC CP 70.

S.O. code no. 23-9006-70. Cover date is 1952.

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART IV: DESIGN OF CENTRE LINES, by S. Goldstein. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1945. 51p diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.40. PB 106852

1. Airfoils, Two dimensional - Theory - Gt. Brit. 2. Airfoils, Two dimensional - Design - Gt. Brit. 3. ARC CP 71.

Cover date is 1952. S. C. code no. 23-9006-71.

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART V: POSITIONS OF MAXIMUM VELOCITY AND THEORETICAL C$_L$ RANGES, by S. Goldstein. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1945. 28p graphs, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 106853

1. Airfoils, Two dimensional - Theory - Gt. Brit. 2. Airfoils, Two dimensional - Velocity distribution - Gt. Brit. 3. ARC CP 72.

Cover date is 1952. S. O. code no. 23-9006-72.

APPROXIMATE TWO-DIMENSIONAL AEROFOIL THEORY. PART VI: AEROFOILS WITH HINGED FLAPS, by S. Goldstein and J. H. Preston. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1945. 44p diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.70. PB 106854

1. Airfoils, two dimensional - Theory - Gt. Brit. 2. Flaps, Aircraft - Hinge moments - Gt. Brit. 3. ARC CP 73.

Cover date is 1952. S. O. code no. 23-9006-73.

AUDITORY PERCEPTION IN AIRCRAFT NOISE, by Juergen Tonndorf. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Dec 1951. 28p diagr, graphs, table Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106826

The problem of communication in noise was explored from the listener's standpoint. In normal subjects perception of pure-tone and speech signals was measured at six intensity levels of simulated aircraft noise (conventional and jet types) under a variety of test conditions. Curves were established depicting levels of threshold and of comfortable listening for both pure tones and speech, and that of optimum speech perception. They allow demonstration of the width of the useful auditory area in noise and of the operational level which offers the most satisfactory perception under each condition. Conclusions and specific recommendations are presented. AAF SAM Proj. no. 21-27-001, Report no. 1.

CALCULATED PRESSURE DISTRIBUTIONS FOR THE R.A.E. 100-104 AEROFOIL SECTIONS, by R. C. Pankhurst and H. B. Squire. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1950. 22p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 106858

1. Airfoils - Pressure distribution - Gt. Brit. 2. R.A.E. 100-104 (Airfoil sections) 3. 100-104 (R.A.F. airfoil sections) 4. Gt. Brit. National Physical Laboratory. Aerodynamics Division 5. ARC CP 80.

Cover date is 1952. Technical note no. Aero. 2039. S. O. Code no. 23-9006-80.

CONTROL OF ODORS IN EVACUATION AIRCRAFT, by A. Haldane Gee, and Alexander H. Pinkes. U.S. Air Force. Wright Air Development Center. Research Division, Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 39p photos, tables Available from Library of Congress, Photoduplication Section, Washington 25, D.C. Microfilm $2.25, Photostat $5.00. PB 106830

This is the preliminary part of the work on an odor control project which has as its ultimate aim the control or elimination of malodors on evacuation aircraft by some suitable agent, preferably for use in aerosol form, without masking such odor alarm signals as the fumes of gasoline, hydraulic fluid, hot oil, scorching paint or burning installation. The present report describes the use of osmometer equioment for producing saturated vapors of odor control agents and for diluting and commingling them with individual and complex malodors. Quantitative data reported show that a number of fairly common odor control agents including aldehydes and essential oils have value against malodor bacteriologically produced and simulating the odor of gas gangrene. These results lay the groundwork for further tests of the more promising agents which will establish what level of alarm odor can be recognized in the presence of such agents. 1st quarterly report under Contract no. AF 33(038)-18819. AAF TR 6565, Part 1.

DERIVATION AND APPLICATION OF A GENERAL FORMULA FOR DIRECTLY COMPUTING THE SKIN THICKNESS OF WINGS AND TAILPLANES, by A. H. Hall. Canada. National Aeronautical Establishment. 1951. 25p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from the National Aeronautical Establishment, Montreal Road, Ottawa, Canada. PB 106908

Out of the innumerable parameters affecting wing stiffness some twenty have been considered, and by a combination of theory, empirics and statistics, have been synthesized to a practical form for the solution of skin thickness. The analysis uniquely includes the effect of chord, span, plan taper, skin thickness taper, profile thickness ratio, taper of profile thickness ratio, position of maximum profile thickness, proportion of chord covered by torsion cell, and material. Statistically considered are the effects of ribs, root restraint, jointing, skin effectiveness, cut-outs, spars, and stringers. The formula can be applied at any stage during design. Published in April 1950 as Report MM-221 of the Division of Mechanical Engineering, National Research Council. NRCC MM-221. NAEC R 12.

DESIGNING A SLOT FOR A GIVEN WALL VELOCITY, by A. Thom and Laura Klanfer. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Dec 1950. 14p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller

Plaza, New York 20, N. Y. $.50. PB 106855

This paper gives the results obtained arithmetically for the wall shape of an expanding passage with specified constant wall velocities. A slot is assumed to withdraw fluid from the passage at the velocity discontinuity and the shape of the slot entry is obtained. A cusp develops at the entrance to the slot and the effect on the remainder of the field of rounding this cusp is considered in detail. Cover date is 1952. Oxford University Engineering Laboratory Report no. 49. ARC CP 76.

DISCRIMINATORY ANALYSIS, VIII: CONTRIBUTION TO THE THEORY OF ACCIDENT PRONENESS. PART I: AN OPTIMISTIC MODEL OF THE CORRELATION BETWEEN LIGHT AND SEVERE ACCIDENTS, by Grace E. Bates. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Dec 1951. 53p graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 106894

Let X be the (random) number of "serious" accidents to be experienced next year and Y the (random) number of "light" accidents experienced in the past. The problem studied is whether or not Y can be useful as predictor of X. A model similar to that of Greenwood-Yule-Newbold implies that X and Y follow a new kind of joint distribution called bivariate negative binomial. Available data indicate indirectly that, at least in some cases, this theoretical distribution approximates the empirical one. On this hypothesis a measure of success of selection using Y is developed. It appears that for Y to be an effect predictor, the light accidents must be either frequent or, in the contrary case, the period of observation of light accidents must be long. Formulae are given for the treatment of the case where severe accidents are frequently fatal. This work was begun under contract with the USAF School of Aviation Medicine and completed with the partial support of the Office of Naval Research. For reports 1-7 see PB 102690-PB 102692, PB 103907-PB 103908, PB 105465, PB 105624; for reports 9-10 see PB 106895-PB 106896. AAF SAM Proj. 21-49-004, Report no. 8.

DISCRIMINATORY ANALYSIS, IX: CONTRIBUTION TO THE THEORY OF ACCIDENT PRONENESS. PART 2: TRUE OR FALSE CONTAGION, by G. E. Bates, and J. Neyman. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Dec 1951. 42p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 106895

The paper deals with the distribution of the numbers $X_1, X_2, \ldots X_s$ of accidents in s successive periods of observation, as implied by the Polya contagious time-effect scheme, generalized to include the possibility of accidents being fatal. Given that the individual survives at least t first periods of observation, the distribution of $X_1, X_2, \ldots, X_t$ is multivariate binomial. This distribution can concide with the similar distribution implied by the no-contagion-no-time-effect mixture model of Greenwood-Yule Newhall only in a most exceptional case. Thus, at least in principle, the presence of contagion and/or of time effect may be subject to statistical tests. The work on this paper, begun under contract with the School of Aviation Medicine, was completed with partial support of the Office of Naval Research. AAF SAM Proj. 21-49-004, Report no. 9.

EFFECT OF HIGH-LIFT DEVICES ON THE LOW-SPEED STATIC LATERAL AND YAWING STABILITY CHARACTERISTICS OF AN UNTAPERED 45° SWEPTBACK WING, by Jacob H. Lichtenstein. U. S. National Advisory Committee for Aeronautics. May 1952. 20p photo, drawings, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106972

Results of a low-speed wind-tunnel investigation to determine the effect of high-lift devices on the static lateral stability derivatives and the yawing derivatives of an untapered 45° sweptback wing are presented. The tests were made in the curved-flow test section of the Langley stability tunnel at a Reynolds number of 1.1×10^6. NACA TN 2689.

EXAMINATION OF THE TECHNIQUE OF THE MEASUREMENT OF THE LONGITUDINAL MANOEUVRING CHARACTERISTICS OF AN AEROPLANE, AND A PROPOSAL FOR A STANDARDISED METHOD by D. J. Lyons. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Sep 1947. 35p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.40. PB 106842

It is demonstrated in this report that the 'steady stick force per g' as defined by Gates and Lyon is the best criterion for the measurement of manoeuvrability of an aircraft because: — (a) practically, it indicates the minimum stick force that has to be exerted by the pilot to break the aircraft, and (b) its value is obtainable in flight by a perfectly definite test procedure. It is further concluded that some additional criterion may be necessary to ensure that unduly heavy forces are not encountered during sharp pull-outs. A method of measuring the steady stick force per g, has been developed at the Royal Aircraft Establishment which it is suggested should be standardised for such tests throughout the country. The results of this method have been demonstrated on two aircraft, a Mosquito and a Lancaster. Cover date is 1952. S. O. code no. 23-2597. ARC RM 2597.

FLIGHT TESTS ON THE PERFORMANCE OF METEOR IV (A TWIN-ENGINED, SINGLE-SEAT JET FIGHTER), by F. Smith, D. J. Higdon and R. H. Plascott. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1946. 13p drawings, graphs, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 106838

Flight tests have been made on a Meteor IV aircraft to measure the performance in level flight and climb. Engine thrust was also measured and non-dimensional curves of net and gross thrust are given. From the engine thrust and level flight results the aircraft drag coefficient has been obtained up to a Mach number of 0.81. The drag rise is somewhat less than that calculated from dive tests on a Meteor I aircraft. Further tests are to be made at high Mach numbers. Cover date is 1951. S. O. code no. 23-2446. ARC RM 2446.

HIGH SPEED WIND TUNNEL TESTS ON AN AEROFOIL WITH AND WITHOUT TWO DIMENSIONAL SPANWISE BULGES, by J. A. Beavan, F.W.E. Rogers and R. Cartwright. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1951. 36p photos, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 106856

1. Airfoils - Spanwise load distribution - Gt. Brit. 2. Airfoils - Wind tunnel tests - Gt. Brit. 3. Wind tunnels, High speed - Tests - Gt. Brit. 4. Airplanes - Models - Tests - Gt. Brit. 5. Gt. Brit. National Physical Laboratory. Aerodynamics Division 6. ARC CP 78.

Cover date is 1952.

INVESTIGATION INTO THE EFFECT OF FORCED AND NATURAL AFTERBODY VENTILATION ON THE HYDRODYNAMIC CHARACTERISTICS OF A SMALL FLYING BOAT (SARO 37) WITH A 1:20 FAIRING OVER THE MAIN STEP, by J. A. Hamilton. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1947. 20p photos, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 106847

Forced ventilation was supplied by an auxiliary power unit driving a centrifugal air compressor. The fairing was ventilated by three sets of ventilating ducts - one set immediately behind the main step, an intermediate set at 30 per cent beam aft of the step, and an aft set at 90 per cent beam aft of the step. Only the forward ducts were force ventilated in the present tests. The tests were made at two weights: 5,900 lb ($C_{\Delta_0} = 1.00$) and 6,200 lb ($C_{\Delta_0} = 1.05$). At 5,900 lb the hydrodynamic characteristics were investigated in taxy runs and take-offs over a range of fixed elevator positions, and in landings over a range of touch-down attitudes. These tests were made with the ducts naturally ventilated. At 6,200 lb the tests were confined to taxy runs with and without forced ventilation. Cover date is 1951. S. O. Code no. 23-2714. Continuation of R. & M. 24 (PB 106055). ARC RM 2714.

I: MATERIALS AND TECHNIQUES FOR SOUND CONTROL IN AIRPLANES. II: VIBRATION INSULATION OF AIRCRAFT SEATS. PROGRESS REPORT OF PROJECT I, by L. L. Beranek, R. H. Nichols, Jr., R. L. Wallace, Jr., H. W. Rudmose, R. L. Brown, W. J. Cunningham, W. S. Cramer. Harvard University. Cruft I aboratory, Cambridge, Mass. Jun 1941. 113p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 106940

The purposes of this report are to present measurements made on a number of aircraft in flight; to present a simple procedure for estimating sound levels in aircraft in advance of construction; to outline engineering procedure for choosing and mounting windows and acoustical materials for maximum sound reductions; and to present pertinent data to verify all conclusions. For part III see PB 106941. OSRD 33, Part I-II.

N. P. L. AEROFOIL CATALOGUE AND BIBLIOGRAPHY, by R. C. Prankhurst. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1951. 22p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 106859

This report catalogues aerofoils which have been designed (or substantially modified) at the N. P. L. and which have been the subject of theoretical investigations, aircraft design studies or wind-tunnel tests. Within these limits it is intended to be complete, except that it excludes a number of wing sections designed expressly to the requirements of aircraft firms. A full Bibliography is appended. Detailed numberial data have been collected together elsewhere. The opportunity has been taken to assign to each aerofoil an NPL number which it is hoped will be quoted in any future reference to it. It is intended to continue this numbering with aerofoils designed subsequently. The arrangement of the lists of aerofoils follows broadly the successive stages in the development of the design theory. Each list is prefaced with a brief indication of the family character of the aerofoils it contains. Cover date is 1952. S. O. Code no. 23-9006-81. ARC CP 81.

THE NO. 2, 11 1/2-FT. X 8 1/2 -FT. WIND TUNNEL AT THE ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH, by D. C. MacPhail, J. G. Ross, and E. C. Brown. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1945. 59p photos, drawings (1 fold) graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $3.50. PB 106837

1. Wind tunnels, High speed - Design - Gt. Brit. 2. Wind tunnels, High speed - Velocity distribution - Gt. Brit. 3. ARC RM 2424.

Cover date is 1951. S. O. code no. 23-2424.

ON THE FORM OF THE TURBULENT SKIN-FRICTION LAW AND ITS EXTENSION TO COMPRESSIBLE FLOWS, by Coleman duP. Donaldson. U. S. National Advisory Committee for Aeronautics. May 1952. 19p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N.W. Washington 25, D. C. PB 106936

A derivation of the form of the incompressible turbulent skin-friction law for an insulated flat plate is made in such a way that it may be extended to compressible flows. The ratio of compressible to incompressible skin friction is obtained, and the results are shown to be in good agreement with existing experimental results. NACA TN 2692.

PHOTOGRAPHS OF SHOCK WAVE MOVEMENT, by H. F. Hilton and R. G. Fowler. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Dec 1947. 12p photos, diagr, graphs Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 106846

Consecutive photographs were taken at millisecond intervals of the flow past a low-drag aerofoil at compressibility speeds. At a Mach number 0.1 above the 'pressure critical' the shock wave was found to oscillate rapidly but aperiodically, whereas the edge of the associated boundary layer remained quite steady, at least for periods of 1/50 sec. At the critical Mach number and just below it a series of small shock waves was observed, apparently

moving against the direction of flow. Cover date is 1952. S. O. Code no. 23-2692. ARC RM 2692.

POWER REQUIREMENTS FOR DISTRIBUTED SUCTION FOR INCREASING MAXIMUM LIFT, by R. C. Pankhurst and N. Gregory. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Sep 1948. 9p diagr Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 106860

This paper considers the power requirements for distributed suction. It appears that they are low for take-off and landing; no estimates can be made for the case of high-speed manoeuvres until tests have been made under the conditions of compressible flow. Cover date is 1952. S. O. Code no. 23-9006-82. ARC CP 82.

PRESSURE PLOTTING TESTS IN THE ROYAL AIRCRAFT ESTABLISHMENT HIGH SPEED WIND TUNNEL ON A 21 PER CENT THICK, LOW DRAG AEROFOIL (BRABAZON I WING ROOT SECTION), by A.B. Haines and W. Port. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1947. 26p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50. PB 106844

1. Brabazon I (Airplane) 2. Wings - Root sections - Pressure distribution - Tests - Gt. Brit. 3. Wind tunnels, High speed - Tests - Gt. Brit. 4. Wings - Model tests - Gt. Brit. 5. Airfoils, Low drag - Pressure distribution - Gt. Brit. 6. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 7. ARC RM 2617.

Cover date is 1952. S. O. Code no. 23-2617.

REVIEW OF SOME STALLING RESEARCH, BY A. D. YOUNG, WITH AN APPENDIX ON WING SECTIONS AND THEIR STALLING CHARACTERISTICS, by H.B. Squire and A. D. Young. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1942. 41p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $4.00. PB 106843

The report includes a general discussion of the effect on stalling behaviour of wing section, plan form, washout, flaps, nacelles, gills, slipstream, automatic wing-tip slots and Hudson-type slits. The important part that is played by the longitudinal trim and stability at incidences near the stall is emphasised. The relation between wing sections and their stalling characteristics is discussed and it is shown that the stalling characteristics can be broadly predicted from an examination of the form of the wing-section upper-surface pressure distribution at high incidences. Cover date is 1951. S. O. Code no. 23-2609. ARC RM 2609.

REVIEW OF THE ESSENTIALS OF IMPACT FORCE THEORIES FOR SEAPLANES AND SUGGESTIONS FOR APPROXIMATE DESIGN FORMULAE, by R. J. Monaghan. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1947. 29p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.60. PB 106848

Classical theories of impact of seaplanes on water have been based on the assumption of a transfer of momentum to a hypothetical associated mass of water attached to the seaplane, such that the total momentum of the two remains constant. Recent developments of the theory show that this treatment fails to take account of momentum shed to the wake formed behind a seaplane when it has forward speed, i.e., it neglects the planing forces. This report reviews the essential theory and assumptions underlying recent work, and puts forward an approximate design formula for the maximum deceleration during a main step impact which is directly a function of the initial impact conditions. Values of the constants are given in generalized curves. Cover date is 1952. S. O. Code no. 23-2720. ARC RM 2720.

SUCTION-SLOT DUCTING DESIGN, by A. G. Rawcliffe. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1947. 16p drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 106840

Models of various design were tested and modified in the light of the results obtained. From these experiments, together with a qualitative analysis of the flow through the type of ducting proposed, specific recommendations have been formulated for the attainment of uniformity of suction combined with low power losses. Investigations were confined to suction from still air. Losses of about $0.2q_1$ were obtained with the broad partition and with q_1 the guide-vane ducts, compared with about $0.7q_1$ for the earlier models, and the distribution of q_1 velocity at the slot was quite satisfactory. The circular collector duct appeared to be more efficient, but suction was much higher at the tip than at the root. Cover date is 1952. S. O. Code no. 23-25-2580. ARC RM 2580.

WALL INTERFERENCE IN WIND TUNNELS OF CLOSED RECTANGULAR SECTION: DEVELOPMENT OF EQUATIONS, by J. Sanders and J. R. Pounder. National Research Council of Canada. Division of Mechanical Engineering. 1951. 27p Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. Limited supply available from the National Aeronautical Establishment, Montreal Road, Ottawa, Canada. PB 106907

This report is supplementary to a paper on "Wall Interference in Wind Tunnels of Closed Rectangular Section" (N.R.C. Report AR-7). Assuming lifting-line theory, expressions for the velocity induced by the walls at points along the span of a wing are derived for symmetrical aerofoils with arbitrary lift distribution. These calculations are extended to unsymmetrical aerofoils and to aerofoils placed above or below the centre-line of the tunnel. New expressions are also obtained for the induced velocity and for the downwash correction at points downstream of a wing. Aeronautical report A-11. Supplement to AR-7. Manuscript received July 1950. NRCC AR-11. NRCC 2600.

WIND TUNNEL INTERFERENCE ON ROI LING MOMENT OF A ROTATING WING, by P. Mandl and J. R. Pounder. National Research Council of Canada.

Division of Mechanical Engineering. 1951. 32p diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. Limited supply available from the National Aeronautical Establishment, Montreal Road, Ottawa, Canada.
PB 106906

Formulae are given for the interference correction to the rolling moment of a rotating wing in a circular wind tunnel; the analysis takes into account the helical path of the trailing vortices. Numerical results for an open tunnel give the variation of the correction factor K with the rate of rotation , for various taper ratios, lift distributions, and wing span: tunnel diameter ratios. It is found that as increases the interference decreases but is more affected by the lift distribution; at all rates of rotation K decreases with taper and increases rapidly with span: diameter ratio. The corrections for closed and open tunnels are opposite in sign, and except as infinitesimal rates of rotation, different in magnitude, the former being the greater. A flaw in one author's investigation is corrected, and agreement with two others is obtained. Rolling moment interference on a wing rotating infinitely slowly in a rectangular tunnel is briefly discussed. Aeronautical report A-12. Published in June 1949 as Report MA-216 of the Division of Mechanical Engineering. NRC 2570. NRCC MA-216. NRCC AR-10.

Instruments

ANALOGUE-COMPUTER SIMULATION OF AN AUTOPILOT SERVO SYSTEM HAVING NONLINEAR RESPONSE CHARACTERISTICS, by Arthur L. Jones and John S. White. U. S. National Advisory Committee for Aeronautics. Jun 1952. 30p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106974

The nonlinear response characteristics of an electrohydraulic servo system were successfully simulated using an electronic analogue computer (differential analyzer). In obtaining a satisfactory simulation it was necessary not only to take into account an easily recognized nonlinear amplifier response but also the accumulative effect of some time lags of the servo system. NACA TN 2707.

ARRANGEMENT OF INSTRUMENTS, THE DISTANCE BETWEEN INSTRUMENTS, AND THE POSITION OF INSTRUMENT POINTERS AS DETERMINANTS OF PERFORMANCE IN AN EYE-HAND COORDINATION TASK, by Paul M. Fitts and Charles W. Simon. U.S. Air Force. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1952. 29p drawing, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 106818

Three experiments are reported in which the effects of various visual stimulus patterns formed by different arrangements of instruments and pointers were studied. For the task employed, which was a continuous, dual-pursuit problem, the results of all three experiments are in agreement in indicating that subjects give significantly superior performance when a. instruments are close together, b. instruments are aligned horizontally, and c. pointers are aligned at 9 o'clock for horizontally-separated instruments and at 12 o'clock for vertically-separated instruments, or else the pointers are counterpoised. The results of an extended learning study indicated that differences in the initial performance of individuals when using the different pointer-position patterns actually increased during fifteen daily practice sessions. The experiments were conducted at Antioch College. Contract no. W33-038-ac-19816. AAF TR 5832.

EYE FIXATIONS OF AIRCRAFT PILOTS. VIII: FIXATIONS DURING ZERO-READER APPROACHES IN A JET AIRCRAFT, by John L. Milton and Fred J. Wolfe. U. S. Wright Air Development Center. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1952. 21p photo, drawings, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 106957

This report covers one of a series of investigations of eye movements of pilots during instrument flight. The frequency, duration, and sequence of eye fixations made by 10 pilots during Zero Reader approaches under simulated instrument conditions are summarized. Comparisons are made between results obtained on Zero Reader approaches and results obtained on ILAS approaches using a somewhat similar instrument panel arrangement. During Zero Reader approaches the Zero Reader Instrument, the Air Speed and the Gyro Horizon are the most used instruments. The Zero Reader, which includes directional gyro information and cross-pointer information, receives the same amount of attention during Zero Reader approaches as the Directional Gyro and Cross-pointer receive during ILAS approaches. The optimal arrangement of the instrument panel for Zero Reader Approaches (using frequency and length of eye movements as the criteria) would call for location of the Zero Reader in the top center position with the Gyro Horizon and Air Speed located adjacent and horizontal. For pts. I-VI see PB 99638, 100105, 100293, 100869, 101830, 106192. AAF WADC TR 52-17.

SUMMARY OF STALL-WARNING DEVICES, by John A. Zalovcik. U. S. National Advisory Committee for Aeronautics. May 1952. 15p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C.
PB 106935

Principles involved in the operation of stall-warning devices are described and conditions under which difficulty may be experienced are pointed out. Some specific examples of stall-warning devices are illustrated and described. NACA TN 2676.

USE OF THE PROPOSED ELECTRIC ISOGRAPH, by K. Mitchell. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1945. 26p diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50.
PB 106836

This note examines in some detail the user's side

of the electric isograph (machine for the solution of polynomial equations) proposed by Dirpose . It is concluded that a machine on these lines would be a most valuable practical tool: certain special features, a list of which is given in the conclusions, appear to be desirable. Numerical methods for improving approximate solutions determined by the isograph are also given, and in particular a further investigation of Bairstow's method shows it to be suitable for determining complex roots of small modulus: where the modulus is large the method should be applied to the reciprocal equation. Cover date is 1951. S. C. code no. 23-2411. ARC RM 2411.

Airports and Airways

EXPERIMENTS TO DETERMINE NEIGHBORHOOD REACTIONS TO LIGHT AIRPLANES WITH AND WITHOUT EXTERNAL NOISE REDUCTION, by Fred S. Elwell. U. S. National Advisory Committee for Aeronautics. May 1952. 75p photos, diagrs, maps, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106880

Experiments to determine neighborhood reactions to the noise of light airplanes with and without noise-reduction equipment were conducted at a number of sites which might be convenient locations for landing strips within the metropolitan area of Boston, Mass. Two standard airplanes and two airplanes modified by reduction gears, four-bladed propellers, and engine exhaust silencers were used. Flights were made close to residential properties of varying income levels, population densities, and proximity to trade centers in order to determine whether the degree of noise reduction previously found to be aerodynamically and structurally practicable produced a significant reduction in neighborhood objections to such aircraft operations. NACA TN 2728.

Aerodynamics

AERODYNAMIC CHARACTERISTICS OF A REFINED DEEP-STEP PLANING-TAIL FLYING-BOAT HULL WITH VARIOUS FOREBODY AND AFTERBODY SHAPES, by John M. Riebe and Rodger L. Naeseth. U. S. National Advisory Committee for Aeronautics. Jun 1952. 48p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106945

An investigation was made in the Langley 300-mph 7- by 10-foot tunnel to determine the aerodynamic characteristics of a refined deep-step planing-tail hull with various forebody and afterbody shapes and, for comparison, a streamline body simulating the fuselage of a modern transport airplane. The results of the tests indicated that the configurations incorporating a forebody with a length-beam ratio of 7 had lower minimum drag coefficients than the configurations incorporating a forebody with length-beam ratio of 5. The lowest minimum drag coefficients, which were considerably less than that of a conventional hull and slightly less than that of a streamline body, were obtained on the length-beam-ratio- 7 forebody, alone and with round center boom. Drag coefficients and longitudinal- and lateral-stability parameters presented include the interference of a 21-percent-thick support wing. NACA TN 2489.

CALCULATION OF THE INFLUENCE OF A BODY ON THE POSITION OF THE AERODYNAMIC CENTRE OF AIRCRAFT WITH SWEPT-BACK WINGS, by H. Schlichting. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1947. 15p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 106841

From systematic three-component measurements of wing-body combinations with swept wings it has been found that the movement of the aerodynamic centre due to the influence of the body is greater for a swept forward than for a straight wing and less for a sweptback wing. The forward shift of the aerodynamic centre due to the body for normal wing body combinations is about 0.06c for a straight wing, about 0.12c for a 30 degrees swept forward, but about zero for a 45 degrees sweptback wing. A simple theoretical method is given for calculating this movement of the aerodynamic centre due to the influence of the body, and it is shown that the agreement with experimental results is quite good. Cover date is 1952. S. O. Code no. 23-2582. ARC RM 2582.

DISPLACEMENT EFFECT OF A THREE-DIMENSIONAL BOUNDARY LAYER, by Franklin K. Moore. U. S. National Advisory Committee for Aeronautics. Jun 1952. 15p diagrs, graph Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106975

A method is described for determining the "displacement surface" of a known three-dimensional boundary-layer flow in terms of the mass-flow defects associated with the profiles of the two velocity components parallel to the surface. The displacement surface height is shown to differ, in general, from that associated with the resultant mass-flow defect, even at stagnation points of the secondary flow. Numerical values are found for the known three-dimensional boundary-layer flow about a cone at a small angle of attack to a supersonic stream. NACA TN 2722.

INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF TRAILING ANTENNAS AT HIGH SPEEDS. FINAL ENGINEERING REPORT ON CONTRACT W33-038-AC-20197, by W. Schwartzapfel. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Mar 1950. 118p photos, diagrs, graphs, tables Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $4.75, Photostat $15.00. PB 106952

The aerodynamic characteristics of trailing antennas at high speeds were investigated. Theoretical considerations dictate that flight speed be lower than the velocity of wave propagation in the cable. The optimum configuration consisted of an .048 in. diam, seven strand phosphor-bronze cable with a spherical steel end-weight. The aerodynamic drag expected from the selected configuration is approx 75 lb at 540 knots. A redesign of the standard antenna reel is suggested in order to provide more torque, operate at a higher speed and incorporate a level wind device.

It is believed that a change in the antenna cable material from phosphor-bronze to copper-coated steel will increase service life in addition to providing greater strength and stability. Project no. CC-551-G. CAI CC-551-G-5.

RECIPROCITY RELATIONS IN AERODYNAMICS, by Max A. Heaslet and John R Spreiter. U. S. National Advisory Committee for Aeronautics. May 1952. 38p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 106879

Reserve-flow theorems in aerodynamics are shown to be based on the same general concepts involved in many reciprocity theorems in the physical sciences. Reciprocal theorems for both steady and unsteady motion are found as a logical consequence of this approach. No restrictions on wing plan form or flight Mach number are made beyond those required in linearized compressible-flow analysis. A number of examples are listed, including general integral theorems for lifting, rolling, and pitching wings and for wings in nonuniform downwash fields. Correspondence is also established between the build-up of circulation with time of a wing starting impulsively from rest and the build-up of lift of the same wing moving in the reverse direction into a sharp-edge gust. NACA TN 2700.

Land Transportation

SOUND LEVELS INSIDE AND OUTSIDE MARMON-HERRINGTON TANKS, by L. L. Beranek, H. W. Rudmose, R. L. Brown. Harvard University. Cruft Laboratory, Cambridge, Mass. Jun 1941. 22p photos, drawing, graphs Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 106941

1. Tanks (Combat) - Noise 2. Marmon-Herrington tanks 3. National Research Council. Committee on Sound Control 4. OSRD 33, part III.

Part III of Progress report of Project I, National Research Council, Committee on Sound Control. For Parts I-II see PB 106940.

Marine Transportation

VLIIANIE POGRANICHNOGO SLOIA NA VOLNOVOE SOPROTIVLENIE KORABLIA (INFLUENCE OF THE BOUNDARY LAYER ON THE WAVE RESISTANCE OF A SHIP), by V. M. Lavrentieff. Translated by Ralph D. Cooper. Apr 1952. 9p diagr Available from Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 106866

1. Plates, Flat - Boundary layer, Laminar - Russia 2. Ships - Wave resistance - Russia 3. DWTMB T245.

From Reports of the Academy of Sciences of the U.S.S.R. 1951, vol. 80, no. 6.

BRIQUETTING OF STRAW, by W. E. Stone. National Research Council of Canada. Prairie Regional Laboratory. Jun 1949. 28p photos, drawing, graph, tables Available from National Research Council of Canada, Prairie Regional Laboratory, Saskatoon, Canada. $.15. PB 106637

Small discus-shaped briquettes weighing approximately 1./2 ounce (15 grams) each have been made from wheat straw, without the use of a binder, by the application of heat and pressure. The temperature used has been varied from 180°C. to 240°C., the pressures from 2,000 lbs/sq. in. to 20,000 lbs/sq. in. and the size of the chopped straw from 1/16 inch to 2 inches. The higher temperatures and pressures and the 2 inch straw produced the strongest and most moisture-resistant briquette. The minimum time necessary to form a satisfactory briquette varied with the temperature and pressure, but under the most favorable circumstances was at least 35 seconds. The maximum time a briquette could safely be heated was found to vary from 10 minutes at 180°C. to 30 seconds at 240°C. Increasing the amount of straw per briquette above 15 grams gave an inferior product. A moisture content in the raw material of less than 10% is recommended. The efficiency of the briquetting process has been determined for certain idealised conditions and it has been found that 50 times as much energy may be obtained from the briquettes by burning as is required for their manufacture.

DIRECTORY OF COMMERCIAL TESTING LABORATORIES IN CANADA, by E. V. Gibbons. Revised by H. B. Dickens. National Research Council of Canada. Division of Building Research. Apr 1952. 25p Available from National Research Council of Canada, Ottawa, Canada. $.25. PB 106962

1. Laboratories, Testing - Directories - Canada 2. NRCC DBR 3 3. NRCC 2602.

Technical report no. 1. This directory was first issued in November 1948. A complete revision of the text is now published.

FURNITURE. REPORT OF A VISIT TO THE U.S.A. IN 1951 OF A PRODUCTIVITY TEAM REPRESENTING THE BRITISH FURNITURE INDUSTRY. Anglo-American Council on Productivity. Apr 1952. 92p photos, drawings, diagrs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.15. PB 106854

1. Furniture - Manufacture 2. Upholstering.

MATERIALS HANDLING IN INDUSTRY. REPORT OF AN INVESTIGATION IN THE U.S.A. MADE BY A GROUP APPOINTED BY THE COUNCIL. Anglo-American Council on Productivity. May 1950. 59p photos, drawings, fold. diagrs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.65. PB 106446

1. Material handling 2. Material handling - Equipment.

UNIVERSITIES AND INDUSTRY. REPORT OF A SPECIALIST TEAM WHICH VISITED THE U. S. A. IN 1951. Anglo-American Council on Productivity. Nov 1951. 38p photos, diagr, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.65. PB 106429

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